

**For Reference**

---

**NOT TO BE TAKEN FROM THIS ROOM**

For Reference

---

NOT TO BE TAKEN FROM THIS ROOM

Ex LIBRIS  
UNIVERSITATIS  
ALBERTAENSIS





Digitized by the Internet Archive  
in 2019 with funding from  
University of Alberta Libraries

<https://archive.org/details/Clendenning1965>







THE UNIVERSITY OF ALBERTA

THE FORWARD CANADIAN DOLLAR 1959-1964

by

ERNEST WAYNE CLENDENNING

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF ARTS

DEPARTMENT OF ECONOMICS

EDMONTON, ALBERTA

JULY, 1965





UNIVERSITY OF ALBERTA  
FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Forward Canadian Dollar 1959-1964," submitted by Ernest Wayne Clendenning, in partial fulfilment of the requirements for the degree of Master of Arts.

Date... July 16, 1965 .....

# THE UNIVERSITY OF CHICAGO

OFFICE OF THE DEAN OF STUDENTS

The University of Chicago is a private, non-sectarian, non-profit institution of higher learning. It is a member of the Association of American Universities and the Association of Christian Colleges and Universities. The University is committed to the highest standards of academic excellence and to the advancement of knowledge in all fields of inquiry. It is a place where the best minds from all over the world come to study and to teach. The University is also committed to the service of the community and to the promotion of the general welfare of the human race.



## ABSTRACT

Speculation is one of the most important factors in the foreign exchange market and, as a result, the foreign exchange authorities and participants in the market must attempt to determine the state of expectations in the market with some degree of accuracy. It would be useful, therefore, if a "barometer of confidence" could be developed that would indicate the type and magnitude of speculative pressure being exerted on a currency at any given time. This study will be an attempt to develop and test a model that employs the behaviour of the forward exchange rate (in particular, the behaviour of the intrinsic premium or discount) as an indicator of confidence or non-confidence in the foreign exchange market.

The study will be divided into two parts: a theoretical part surveying the theory of forward exchange and developing the particular model to be employed in the study; and an empirical part in which the model will be applied to the Canadian data and the results analyzed over a five year period surrounding the May, 1962 devaluation of the Canadian dollar.



## ACKNOWLEDGEMENT

I wish to express my gratitude to Professor T. L. Powrie for his guidance and assistance during the preparation of this thesis. He has read and discussed the manuscript with me on a number of occasions and his criticisms and suggestions have been invaluable. I would also like to thank Professor W. D. Gainer for his interest and advice throughout the preparation of this study.

In addition, I wish to acknowledge my debt to Professor G. F. MacDowell of Brandon College, who provided me with the inspiration and encouragement to continue my studies.

Finally, I would like to acknowledge my indebtedness to the University of Alberta for providing me with financial assistance during the period of my study.



## TABLE OF CONTENTS

	Page
ABSTRACT . . . . .	iii
ACKNOWLEDGEMENT. . . . .	iv
LIST OF FIGURES . . . . .	vii
LIST OF TABLES . . . . .	viii
LIST OF CHARTS . . . . .	ix

### PART I. THE THEORY OF FORWARD EXCHANGE

#### Chapter

1. THE STATIC AND DYNAMIC THEORIES OF FORWARD EXCHANGE . . . . .	2
A. Definition of Terms B. The Static Theory C. The Dynamic Aspects of Forward Exchange D. The Dynamic Approach	
2. THE NATURE AND CAUSES OF INTRINSIC PREMIUMS AND DISCOUNTS . . . . .	31
A. The Assumptions of the Model B. The Types of Demand and Supply of Forward Exchange C. The Effects of Stabilizing and Destabilizing Speculation D. The Types of Intrinsic Premiums and Discounts E. The Usefulness of the Model	

### PART II. THE FORWARD CANADIAN DOLLAR 1959-1964

3. THE FORWARD CANADIAN DOLLAR AND THE U. S. -CANADIAN INTEREST RATE DIFFERENTIAL 1959-1964 . . . . .	58
---	----







A. The Behaviour of the Spot Canadian Dollar 1959-1964	
B. The Premium or Discount on the Forward Canadian Dollar 1959-1964	
C. The U. S. - Canadian Interest Rate Differential 1959-1964	
D. The Intrinsic Premium or Discount on the Forward Canadian Dollar 1959-1964	
4. AN ANALYSIS OF THE INTRINSIC PREMIUMS OR DISCOUNTS ON THE FORWARD CANADIAN DOLLAR 1959-1964. . . . .	72
A. The Presence of "Doubt" Intrinsic Premiums or Discounts	
B. The Presence of "Confidence" Intrinsic Premiums or Discounts	
C. The Possible Role of Official Intervention in the Market for Forward Canadian Dollars	
D. An Assessment of the Model	
5. CONCLUSION . . . . .	88
BIBLIOGRAPHY . . . . .	91



## LIST OF FIGURES

	Page
Figure 1 . . . . .	37
Figure 2 . . . . .	40
Figure 3 . . . . .	47
Figure 4 . . . . .	50



## LIST OF TABLES

Table	Page
1. Calculation of the Forward Premium (or Discount) on the Forward Canadian Dollar as a Per Cent per Annum of the Spot Rate 1959-1964. . . . .	60
2. Calculation of the Interest Parity Value of the Forward Canadian Dollar and the Intrinsic Premium (or Discount) on the Forward Canadian Dollar 1959-1964. . . . .	62
3. Exchange Fund Account Monthly Forward Exchange Transactions and Balance of Forward Exchange Transactions Outstanding 1959-1964. . . . .	81



## LIST OF CHARTS

Chart	Page
1. The Spot Canadian Dollar 1959-1964 . . . . .	65
2. The Interest Parity Value of the Forward Canadian Dollar and the Forward Premium (or Discount) on the Forward Canadian Dollar 1959-1964 . . . . .	68
3. The Intrinsic Premium (or Discount) on the Forward Canadian Dollar 1959-1964. . . . .	71





## PART I

### THE THEORY OF FORWARD EXCHANGE



## CHAPTER 1

### THE STATIC AND DYNAMIC THEORIES OF FORWARD EXCHANGE

This chapter will discuss the development of forward exchange theory from the original static theory to the modern dynamic approach that is accepted by most economists today. In addition, a number of implications of the dynamic aspects of forward exchange will be analyzed. The chapter will be developed in four major sections as follows: section A will define the terminology to be used in this and subsequent chapters and will discuss the meaning of static and dynamic analysis as applied to forward exchange; section B will outline and discuss the static theory of forward exchange; section C will analyze the main dynamic aspects of forward exchange; and, section D will summarize the modern dynamic approach to forward exchange.

In this and subsequent chapters, the analysis is developed within the framework of a two country, two currency model. Although the analysis could easily be extended to a multi-country, multi-currency model, this would add very little to the results obtained from the simpler case. In addition, a pegged exchange rate system is assumed throughout this chapter.

#### A. Definition of Terms

Before turning to the development and analysis of the static and dynamic theories of forward exchange, it would be wise to introduce the distinctive terminology that has been built up in the field of forward



exchange and which will be used throughout this study. In addition the meaning of the terms static and dynamic as applied to the theory of forward exchange will be explicitly defined in order to avoid any confusion in the later sections of this chapter.

Paul Einzig<sup>1</sup> provides the following useful definitions of the main terms used in the "language" of forward exchange:

(1) Foreign Exchanges - are means of payment or instruments of short-term credit of other countries with different monetary units, regarded from the point of view of their purchase or sale against the national currency, or of that of their holding as reserves.

(2) Foreign Exchange - means the process or system of converting one national currency into another.

(3) Forward Exchanges - are foreign exchanges bought or sold for future delivery against payment in national currency on delivery.

(4) Spot Exchanges - are foreign exchanges bought and sold for delivery two days after conclusion of the deal and paid for on delivery.

(5) Forward Rates - are the actual rates for foreign exchanges bought and sold for future delivery.

(6) Forward Margins - are the differences between spot rates and forward rates.

(7) Premium and Discount - if forward exchanges are worth more than the corresponding spot exchanges they are at a premium; if they are worth less they are at a discount.

(8) Interest Parity - is the difference between short-term interest rates prevailing in two centres at a given moment.

(9) Intrinsic Premium and Intrinsic Discount - represent the discrepancy between interest parities and forward margins. When forward exchanges are above their Interest Parities the difference constitutes an intrinsic premium. When they are below their Interest Parities the difference is an intrinsic discount.

(10) Swap Transactions - are the purchase or sale of spot exchanges against the sale or purchase of forward exchanges.

(11) Outright Transactions - are transactions in which the

---

<sup>1</sup>Paul Einzig, A Dynamic Theory of Forward Exchange (London: MacMillan and Co. Ltd., 1961), pp. 2 - 4.





purchase or sale of forward exchanges is not linked with a spot transaction.

(12) Covering - by means of forward exchange transactions is a means to safeguard against the exchange risk on a definite date in connection with a self-liquidating commercial or financial transaction.

(13) Hedging - by means of forward exchange transactions is an arrangement to safeguard an indefinite and indirect exchange risk arising from the existence of assets and liabilities whose value is liable to be affected by changes in the spot rates.

(14) Interest Arbitrage - is the international transfer of funds to a foreign centre, or the maintenance of funds in a foreign centre instead of repatriating them, for the sake of benefiting by the higher yield on its short-term investment in that centre.

(15) Inward and Outward Arbitrage - is the influx or efflux of funds to or from a country as a result of interest arbitrage, covered or uncovered.

(16) Positions or Open Positions - constitute the difference between the total of a foreign currency owned or receivable and the total of the same currency payable under definite contracts. If the amount held or receivable exceeds the amount payable, the difference represents a long position. If the amount held or receivable is inferior to the amount payable, it constitutes a short position.

(17) Bear Positions and Bull Positions - are short and long positions deliberately created for speculative purposes either by forward exchange operations or by borrowing or lending abroad and selling or buying spot exchange.

(18) Commitments - arise when there is no discrepancy between the amount of foreign currencies owned or receivable and the amount of the same currencies payable but there is a difference between delivery dates. Thus, while an outright transaction creates an open position, a swap transaction creates a commitment.

These terms constitute the basic terminology of forward exchange and will be used in accordance with the above definitions throughout the remainder of this study.

We will now turn to the problem of defining the terms static and dynamic as used in describing the theory of forward exchange. These terms have been much abused in the field of economics and, as a result, the manner in which they are to be used in this study must be defined precisely.





There are three main aspects to be considered when attempting to describe any economic theory. The theory may involve either a static or a process type of analysis; it may involve either a partial or a general equilibrium situation; and the variables involved may be either stocks or flows. These three aspects can be combined into various combinations and referred to as either static or dynamic economic analysis. We must now determine the combinations that we will define as static and dynamic for the purposes of this study.

We will first consider static economic analysis, about which Due and Clower have the following to say:

The static approach seeks to define equilibrium positions, that is, the set of relationships among the various elements which, once attained, will continue so long as the determinants of the situation remain unchanged. Static analysis refers indirectly to the process by which equilibrium is reached, and also describes the differences between one equilibrium and another reached subsequent to a shift in the determinants, the latter type of analysis often being designated as comparative statics. For the most part, however, static theory deals with the definition of equilibrium positions and the requirements for equilibrium, and essentially abstracts from time, in the sense that equilibrium values of the variables are not dependent upon time.<sup>2</sup>

Vickery states the concept of comparative statics analysis even more concisely:

In some ways the study of comparative statics . . . may be described in terms of considering the administration of some specific disturbance to a system previously in static equilibrium, and comparing the original state with the state approached by the system subsequently, on the assumption that it is allowed to come to this equilibrium without further disturbance.<sup>3</sup>

In his discussion Vickery also considers a special form of comparative statics in which the adjustments to the new equilibrium are

---

<sup>2</sup> John F. Due and Robert W. Clower, Intermediate Economic Analysis (4th ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1961), pp. 27 - 28.

<sup>3</sup> William S. Vickery, Microstatics (New York: Harcourt, Brace & World, Inc., 1964), p. 18.



made instantaneously:

Another alternative notion of statics is to consider it the study of what would happen if various types of adjustments could be made instantaneously instead of requiring more or less time and if the effects of the movements involved in this adjustment could be ignored. The notion of instantaneous adjustment is at best unreal, however, so that following this line is very likely to lead to some rather uncomfortable paradoxes. It can be modified, however, by assuming that the time required for adjustment is small compared with the time interval between disturbances to the system, so that there is actually time for an equilibrium to be reached, or at least approached reasonably closely, before the system is again disturbed.<sup>4</sup>

In static analysis, Vickery points out, there will also be an absence of uncertainty:

For with the same thing going on day after day, the individuals eventually become aware of what is happening and after all adjustments to such knowledge have taken place and the economy comes to a static condition, there will necessarily be absence of uncertainty on the part of individuals about such matters of current occurrence as concern them.<sup>5</sup>

The static approach can be of either a partial or a general equilibrium nature. Partial analysis deals with isolated markets and stresses the determination of one dependent variable from one independent variable while all other variables are held constant--that is, a "ceteris paribus" situation. General analysis, however, is concerned with interconnected markets and emphasizes mutual interrelationships among all the variables of the system. Process analysis can also be either partial or general in nature.

In this study, therefore, the term static, when used to describe the theory of forward exchange, will mean a partial comparative statics analysis in which adjustments to a new equilibrium position after some disturbance will be made instantaneously or almost instantaneously. In

---

<sup>4</sup>Ibid., p. 18.

<sup>5</sup>Ibid., p. 17.





the static approach there will be an absence of uncertainty and, as a result, the adjustment process will take place entirely through flows of arbitrage funds.<sup>6</sup>

On the other hand, dynamic process analysis, as Due and Clower point out, is quite different from static analysis:

By contrast dynamic analysis introduces the element of time in an essential way, that is, values of the variables at a particular time are dependent in part upon their values at past moments of time. Thus, time becomes an element in the system, and emphasis is placed on processes of adjustment rather than upon the determinants of equilibrium.<sup>7</sup>

Baumol takes a similar position when he defines economic dynamics as "the study of economic phenomenon in relation to preceding and succeeding events."<sup>8</sup> In contrasting static and dynamic analysis Baumol continues:

Thus the static method analyzes a 'time slice', a cross section of the economy, thereby eliminating the passage of time from the problem, though, as we shall see, not necessarily eliminating the influence of time altogether. It is the study of such time slices which we call statics, whereas the study of economic problems where the time axis is not abstracted from we here call dynamics.<sup>9</sup>

In this study, therefore, when the term dynamic is used to describe the theory of forward exchange, we will be referring to a

---

<sup>6</sup>This appears to be the approach taken by J. M. Keynes, Monetary Reform (New York: Harcourt, Brace and Company, 1924), pp. 125-51 and by Charles P. Kindleberger, "Speculation and Forward Exchange," Journal of Political Economy, Vol. XLVII (April, 1939), pp. 163 - 81. These approaches will be discussed in greater detail in the next section of this chapter.

<sup>7</sup>Due and Clower, op. cit., p. 28.

<sup>8</sup>William J. Baumol, Economic Dynamics (2nd ed.; New York: The MacMillan Company, 1959), p. 4.

<sup>9</sup>Ibid., p. 6.



general equilibrium process type of analysis. This type of analysis enables the introduction of uncertainty into the model and permits the use of stock variables (in the case of forward exchange theory the limited stock of arbitrage funds).<sup>10</sup> In this study no attempt will be made to develop a complete dynamic general equilibrium model, but a number of the interrelationships between the variables involved will be analyzed and the need for such a model will be emphasized in Sections C and D of this chapter.

Because of the difficulties in developing a dynamic general equilibrium model and testing it empirically, we will return in Chapter 2 to a partial equilibrium comparative statics analysis in developing the specific model to be employed in this study.<sup>11</sup> This model will differ from the pure static model discussed in this chapter in that uncertainty will be allowed to enter the analysis. As a result, both speculative and arbitrage flows will exist in the forward exchange market and the interaction of these flows will determine the equilibrium position of the market at any given moment. The use of flow variables rather than stock variables in this model is defensible on the grounds that the model deals only with a very short-run period during which changes in the stock of funds available for arbitrage and speculative purposes are of little significance.

---

<sup>10</sup>This appears to be the approach taken by Einzig, *op. cit.*, pp. 275 - 86. He does not develop a rigorous theoretical model of his dynamic theory but does, however, point out that a general equilibrium process analysis is needed to fully understand and explain the effects of forward exchange on the economic system.

<sup>11</sup>This model will be similar to that developed by B. Reading, "The Forward Pound 1951-59," The Economic Journal, Vol. LXX (June, 1960), pp. 304 - 19.





### B. The Static Theory

J. M. Keynes<sup>12</sup> was the first to develop a static "interest-parity" theory of forward exchange. Underlying this theory were the following basic rules that governed the behavior of forward exchange rates:

(1) The greatest influence on forward exchange rates is the difference between the interest rates obtainable on short-term money in the two financial centres. As a result the forward margin tends to equal the difference between the interest rates in the two centres, i. e. the forward rate tends to equal its interest parity value.

(2) The forward rate tends to fluctuate around its interest parity value in accordance with the supply of and demand for forward exchange.

(3) Whenever the forward rate departs from its interest parity to a sufficient extent to yield arbitrageurs a profit large enough (i. e. above 1/2% per annum) to make it worth their while to operate they will shift funds to the more profitable centre. This would tend to return the forward rate to its interest parity value.

These rules, therefore, formed the foundation of the static theory since they stressed the natural trend of forward rates to adapt themselves to their interest parities and to fluctuate in a narrow range about them. The inevitability of the perfect and instantaneous adjustment of forward rates to changes in interest rates resulted from the fact that arbitrage flows would take place so quickly and in such a volume as to force the forward rates to their interest parity values instantaneously. Under the static theory, therefore, any discrepancy between the forward margins and the interest parity, whether caused by changes in interest rates, spot rates, or expectations, would be eliminated automatically and

---

<sup>12</sup>Keynes, op. cit., pp. 125 - 51.



instantaneously by covered arbitrage flows. The arbitrage flows, in turn, would tend to eliminate balance of payments problems by transferring funds from the country with a balance of payments surplus (low interest rate country) to the country with a balance of payments deficit (high interest rate country).

J. Spraos<sup>13</sup> and S. C. Tsiang<sup>14</sup> employ a simple mathematical formulation of the interest parity theory which clearly illustrates the core of the static theory. Using Tsiang's notation it is as follows:

Let: SR = the spot exchange rate

FR = the forward exchange rate

$\frac{FR}{SR}$  = the forward rate expressed as a per cent per annum  
of the spot rate

Ia = the short-term per annum interest rate of country A

Ib = the short-term per annum interest rate of country B

Now: Short-term funds would flow from country A to country B if:

$$\frac{FR}{SR} (1 + Ib) > (1 + Ia)$$

and from country B to country A if:

$$\frac{FR}{SR} (1 + Ib) < (1 + Ia)$$

Now: If an inequality existed that would cause funds to flow from A to B, these arbitrage operations would remove this inequality through three possible effects (1) raising the

---

<sup>13</sup>J. Spraos, "The Theory of Forward Exchange and Recent Practice," The Manchester School of Economic and Social Studies, Vol. XXI (May, 1953), pp. 87 - 117.

<sup>14</sup>S. C. Tsiang, "The Theory of Forward Exchange and Effects of Government Intervention on the Forward Exchange Market," International Monetary Fund Staff Papers, Vol. VII (April, 1959), pp. 75 - 106.





spot rate, (2) lowering the forward rate, or (3) raising the short-term interest rate in country A and lowering it in country B.

Therefore the equilibrium position of the system after arbitrage operations had corrected any disturbing influence would be:

$$\frac{FR}{SR} (1 + I_b) = (1 + I_a)$$

Now: Let  $p = \frac{FR - SR}{SR}$  = forward premium (or discount if negative)

Therefore:  $\frac{FR}{SR} = 1 + p$  and

$$(1 + p) (1 + I_b) = (1 + I_a)$$

The term  $pI_b$ , however, is so small that it can be ignored.

Therefore:  $p = I_a - I_b$

This equation states that the system will be in equilibrium when the forward premium (or discount) tends to be equal to the interest rate differential between the two countries involved. The static theory maintains that this equilibrium will inevitably be brought about by covered interest arbitrage flows and that an intrinsic premium or discount that arises as the result of changes in interest rates, spot rates, or expectations is almost instantaneously removed by the operation of covered arbitrage capital movements. The static theory, therefore, places the main load of the adjustment to a new equilibrium on covered arbitrage flows. If the funds available for arbitrage are sufficiently large the forward exchange rate would behave in the manner described by the static theory.

There are, however, limits to the volume of funds available for arbitrage purposes as Keynes points out:



But there is a further contingency of considerable importance which occurs when speculation is exceptionally active and is all one way. It must be remembered that the floating capital normally available, and ready to move from centre to centre for the purpose of taking advantage of moderate arbitrage profits between spot and forward exchange, is by no means unlimited in amount, and is not always adequate to the markets requirements.<sup>15</sup>

It may be possible, therefore, that arbitrage flows will not always be large enough to bring about a readjustment of forward rates to their interest parities. This would leave the forward rate at an intrinsic premium or discount and open the door for the dynamic aspects of forward exchange to enter the analysis. As a result, Keynes was the first to perceive of the possibility of a dynamic approach to forward exchange.

Charles Kindleberger takes a somewhat different, although still static, view of forward exchange. He states that:

. . . When it is stripped of its technical refinements and ramifications the forward contract in foreign exchange introduces no real change in the foreign exchange theory. Spot funds are moved between countries when a speculative position is taken in either spot or forward exchange . . . .<sup>16</sup>

That is:

The technique of the forward market does not result in any essential difference in the analysis of exchange rate fluctuations or in international movements of short-term funds.<sup>17</sup>

The presence of forward exchange facilities, therefore, would merely shift some of the buying and selling pressure from the spot to the forward market, leaving the sum total of both and the effects on exchange rates, capital movements, interest rates, balance of payments, and

---

<sup>15</sup>Keynes, op. cit., p. 140.

<sup>16</sup>Kindleberger, op. cit., p. 179.

<sup>17</sup>Ibid., p. 181.





price levels the same as they would have been in the absence of forward facilities.

This view of the forward market is founded on the static theory of forward exchange and constitutes what Einzig calls the relative static theory of forward exchange. Objections to this type of static theory as well as those to the more general static theory will be raised and discussed in the next section of this chapter.

The fundamental rule of the static theory of forward exchange, therefore, is that the forward rates tend to adjust themselves to their interest parities. Deviations from the interest parities are considered to be purely temporary and are expected to be readjusted, automatically, unless adjustment is prevented by external influences - namely the shortage of arbitrage funds. In other words a permanent intrinsic premium or discount cannot arise under the static theory except under the influence of external factors. As a result, if arbitrage funds were available in sufficient volume, forward rates would behave in a manner that would always restore the system to a static equilibrium. That is, the forward rates, themselves, could never exert a disturbing influence on the international money market under the static analysis.

### C. The Dynamic Aspects of Forward Exchange

The complete reliance of the static theory on the ability of covered interest arbitrage to always restore forward rates to their interest parities and the possibility that the volume of arbitrage funds may not be sufficient to produce this effect raises grave doubts about the creditability of the static theory. As Tsiang points out:

The Theory of Forward Exchange badly needs a systematic reformulation. Traditionally the emphasis has always been upon covered interest arbitrage, which forms the basis of the so-called



interest parity theory of forward exchange. Modern economists, of course, recognize that operations other than interest arbitrage, such as hedging and speculation, also exert a determining influence upon the forward exchange rate, but a systematic theory of forward exchange which explores precisely how the interplay of all these different types of operations jointly determine the forward exchange rate and how the forward exchange market is linked to the spot exchange market still appears to be lacking.<sup>18</sup>

In order to determine the interactions between covered interest arbitrage, speculation, hedging, and commercial operations and the forward exchange rate a dynamic process analysis must be used. The task of this section, therefore, will be to analyze these interactions within the framework of a process analysis.

The dynamic aspects of forward exchange will appear only in the presence of a persistent intrinsic premium or discount. If the forward rate always returned to its interest parity value automatically after any disturbance, then the static theory would hold and forward exchange would always restore the international money market to a new equilibrium position and could not cause any disturbing influences by itself. As a result, the first task is to determine if, how, and why intrinsic premiums or discounts are able to develop and persist.

An intrinsic premium or discount can arise as a result of any one of the following situations when the volume of readjusting arbitrage operations is inadequate:

- (1) Persistent excess or deficiency of commercial supply over commercial demand.
- (2) One-sided hedging.
- (3) One-sided speculation

The interaction of the above factors, therefore, determines whether or

---

<sup>18</sup>Tsiang, op. cit., p. 75.





not a forward currency can be at an intrinsic premium or discount persistently and, hence, whether or not forward exchange can have a disturbing effect on the money or exchange markets.

The most obvious and frequent cause of a lasting difference between commercial demand for and supply of forward exchange is an import or export surplus. For example, if a country has an import surplus on its current account, importers will be selling more domestic currency forward (buying more foreign currency forward) than exporters are buying forward. This, of course, will tend to push the forward rate to an intrinsic discount.<sup>19</sup> If this import surplus is accompanied by the expectation of a devaluation of the spot rate, one-sided covering may also develop. This would result in importers covering their foreign exchange risks by selling the domestic currency forward and exporters leaving their exchange position uncovered in the hope of gaining from the expected fall in the spot rate. As a result the intrinsic discount on the forward domestic currency would widen.

If the import surplus did not give rise to expectations of a devaluation of the spot rate, speculators would act in a manner that would offset the excess supply of forward domestic currency - that is, they would buy domestic currency forward in the hope of making a profit when the spot rate rose again to its parity value. However, if a devaluation was anticipated speculators would instead sell the domestic currency forward and further widen the intrinsic discount. These conditions would also lead to one-sided hedging as foreign owners of domestic

---

<sup>19</sup>This is assuming a pegged spot rate. Therefore, although the pressure is on both spot and forward markets, only the forward rate can move, thereby creating an intrinsic discount.



assets would sell the domestic currency forward in order to protect the value of their domestic assets in terms of foreign currency. It is probable then, that whenever there appears to be an obvious reason for expecting a movement of the spot rate, commercial, hedging and speculative operations all tend to become one-sided in the same sense.

As the forward domestic currency moved to an intrinsic discount it would provide an incentive for outward covered interest arbitrage operations. Under the static theory the mere presence of this incentive would cause the forward rate to adjust automatically and instantaneously back to its interest parity value as a result of the instantaneous arbitrage flows that would take place. In reality, however, because of the uncertain volume of funds available for arbitrage purposes, the adjustment is unlikely to be complete and continuing outward arbitrage movements are likely to develop. These persistent outward arbitrage flows would put additional pressure on the spot rate and the foreign exchange reserves, which, in turn would strengthen the expectation of a devaluation. As a result, speculators, hedgers and commercial operators would sell more domestic currency forward and, thereby, maintain or widen the intrinsic discount. This, in turn, could lead to further outward arbitrage, with its disturbing influences on interest rates, spot rates and the balance of payments.

Therefore, the reason why intrinsic premiums or discounts are apt to be both substantial and persistent is that funds available for arbitrage operations are not unlimited and as a result, there are not enough arbitrage operations to offset a speculative pressure. As Einzig points out:

On occasions of strong speculative pressure the funds available for arbitrage are liable to become exhausted and arbitrage demand





ceases to provide the counterpart for speculative selling. Once that stage is reached the discrepancies are bound to widen until speculators and others may feel induced to take their profits by closing their positions . . . What is important to realize is that an uneasy but prolonged state of equilibrium can exist between supply and demand in the Forward Exchange market even though forward rates are substantially undervalued or overvalued.<sup>20</sup>

One reason why the funds available for arbitrage are limited is because banks, which are the major sources of arbitrage funds, will not employ more than a small proportion of their liquid assets in these operations. It would take very high intrinsic premiums or discounts to induce them to withdraw funds from their regular customers for employment in arbitrage operations. In addition, only large international firms have sufficient funds available to enter the market and they will only enter at very high intrinsic premiums or discounts because of the relatively high cost involved.

As Einzig concludes, therefore,

The main reason why abnormal intrinsic premiums or discounts ever exist over long periods is that while there are limits to the volume of direct or indirect interest arbitrage, there are virtually no limits to the speculative pressures it is supposed to counteract.<sup>21</sup>

As a result, if the forward rates are to be restored to their interest parities, the expectations of speculators, hedgers, and commercial operators must be changed, thereby reversing the one-sided pressure on the forward exchange market.

Since intrinsic premiums and discounts are able to develop and persist, forward exchange can have disturbing effects on the system. It no longer plays the passive role that the static theory assigned to it. A

---

<sup>20</sup>Einzig, op. cit., pp. 182 - 183.

<sup>21</sup>Ibid., p. 185.



number of these effects - the interrelationships between interest rates and forward rates, between the balance of payments and forward rates, and between spot rates and forward rates - will now be analyzed in some detail.

Under the static theory forward margins are supposed to compensate for the discrepancies between interest rates in various centres. This implies that forward rates are determined unilaterally by their interest parities without any reciprocal effect on the interest rates in the two centres. As a result, the static theory maintains that short-term interest rates are supposed to be practically identical at any given moment in all financial centres, if we allow for the premium or discount on the forward exchange between the two centres concerned. These conclusions of the static theory are founded on two assumptions: (1) that the adjustment between forward rates and their interest parities is complete and practically instantaneous, and (2) that forward rates always play a passive role in the process of adjustment; that is, the adjustment takes place solely through the effect of interest rates on forward rates. The first of these assumptions has already proven to be false and it will now be shown that the second is equally unrealistic.

Even in normal conditions, that is, in the absence of speculation, a change in interest parities will not cause a complete and automatic readjustment of the forward rate to the new interest parity and arbitrageurs will actually operate between the two centres. As a result, one of the centres will lose funds and the other will gain funds. This will cause a contraction of credit in the losing money market and expansion of credit in the gaining money market. If it is not neutralized, therefore, this movement of funds would lead to a rise in the interest rate in the losing centre and a fall in the gaining centre and the result would be an





adjustment of the interest parity to the forward margin.

In situations where speculation is also present forward rates will have an even greater effect on interest rates in the two centres. As Einzig points out:

In abnormal conditions forward rates are apt to become a very important factor in determining interest rates. Lasting and substantial discrepancies between Interest Parities and forward margins are apt to affect interest rates markedly. The less readily forward margins adjust themselves to their Interest Parities the more they are apt to influence interest rates.<sup>22</sup>

Under conditions of strong speculation an intrinsic premium or discount could persist for some time and as a result large arbitrage flows would take place between the two centres - with the funds flowing from the centre with an intrinsic discount to the centre with an intrinsic premium.

Outward arbitrage under these conditions tends to raise the interest rates in the country whose forward exchange is at an intrinsic discount for the following reasons:

(1) pressure on the spot rate caused by outward interest arbitrage will necessitate official support for the spot rate and lead to a decline in foreign exchange reserves, a decline in the volume of treasury bills, and possibly a general contraction of credit;

(2) the possibility of earning a high profit by employing funds in interest arbitrage makes domestic banks reluctant to accept a much lower yield on domestic short-term investments;

(3) the monetary authorities may restrict credit so as to reduce the volume of resources available for interest arbitrage.

The fall in the interest rates of the countries whose forward exchange is at an intrinsic premium would be produced as follows:

---

<sup>22</sup>Ibid., p. 197.



(1) the influx of funds through inward interest arbitrage would result in official operations to prevent an appreciation of the spot rate beyond the support point;

(2) since outward arbitrage is impossible, banks are forced to find employment for their funds in the local money market, thereby lowering interest rates;

(3) the authorities may try to defend themselves against this inflow by lowering the Bank rate;

(4) domestic banks may borrow in the country whose forward exchange is at an intrinsic discount for the sake of the profit on inward arbitrage and transfer the proceeds to the domestic market, thereby lowering domestic interest rates (and raising interest rates in the other country).

Under conditions of strong speculative pressure against one of the currencies involved, a rather paradoxical arbitrage flow can take place. For example, assume that the currency of the high interest rate country comes under severe speculative pressure. This will result in a widening of the intrinsic discount to the point where it becomes profitable to transfer arbitrage funds from the high interest rate country to the low interest rate country. Einzig sums this up as follows:

As a result of lasting discrepancies between Interest Parities and forward rates, situations may, and frequently do, arise in which funds move from the dearer market to the cheaper market. Money tends to become dearer in markets where it is dear already, and it tends to become cheaper in markets where it is cheap already. This phenomenon alone should suffice to expose the utter inadequacy of the static theory, which is entirely incapable of accounting for it, and to prove the need for a dynamic theory.<sup>23</sup>

---

<sup>23</sup>Ibid., p. 204.





We will now turn to explore the interrelationships between the balance of payments and forward exchange. An adverse change in the current account balance of a country means less commercial buying and/or more commercial selling of its currency for forward delivery. This imbalance would also lower the spot rate towards its lower support point. The secondary effect of the balance of payments change depends on whether the spot rate is maintained between its support points and whether the market has confidence in the government's determination and ability to continue to uphold the support points.

If this confidence is present and the spot rate approaches the lower support point, forward rates become overvalued (i. e. an intrinsic premium develops) because no supply of forward currency would be forthcoming at rates below the support point. This would give rise to inward arbitrage flows which would tend to offset the effect of the adverse commercial factor. If this confidence is not present, however, the forward discount widens as the spot rate falls towards the lower support point and an intrinsic discount may develop. As a result, an outward arbitrage flow would take place and additional pressure on the spot rate would develop. Therefore, instead of off-setting the effect of the adverse balance of payments, arbitrage would aggravate it and, hence, would not fulfil the role of eliminating discrepancies attributed to it under the static theory.

A change in the forward rate caused by a change in the balance of payments may also have direct effects on the balance of payments by affecting the volume of imports and exports. Assuming that an adverse change in the balance of payments has caused a depreciation of the forward rate, imports will become more expensive and exports cheaper because of the change in the cost of covering. This would tend to reverse



the previous change in the balance of payments.

The trade balance also affects forward rates through its influence on interest rates, which tend to rise in the country with an adverse trade balance and fall in the country with the favorable trade balance. The increased interest rate could have a beneficial effect and Einzig sums up this interrelationship as follows:

In so far as intrinsic discount due to adverse trade balance leads to higher interest rates and tightens money conditions, and in so far as these in turn lead to lower prices, it will have eventually a favorable effect on the volume of exports and imports. Conversely, in so far as an intrinsic premium due to favorable trade balance leads to cheaper and easier money and in so far as this in turn leads to higher prices, it will effect imports and exports unfavorably.<sup>24</sup>

Therefore, as Einzig points out:

Depreciation or appreciation of a Forward Exchange through one-sided commercial transactions due to a balance of payments surplus or deficit gives rise to a tendency towards readjustment of the trade balance of a country with an overvalued or undervalued spot currency, both through its direct effect on imports and exports, and through its indirect effect on prices through the intermediary of interest rates and the supply of credit.<sup>25</sup>

The importance of these influences on the trade balance, however, is probably not very great because of the fact that forward covering costs are only a small fraction of the prices of imports and exports and that prices are generally rather inflexible downward. As a result, they would be completely inadequate in offsetting the effect of destabilizing speculation on the balance of payments. Forward exchange, therefore, could have a disturbing effect on the balance of payments and would not always behave in the manner indicated by the static theory.

The relationship between spot and forward rates is crucial for the acceptance or rejection of a dynamic theory of forward exchange. This

---

<sup>24</sup>Ibid., p. 222.

<sup>25</sup>Ibid., p. 222 - 23.





is made clear in the following quotation from Einzig:

The answer to the question whether forward operations or changes in forward rates are liable to affect spot rates, and, if so, in what way and to what extent makes a fundamental difference to our conclusion about the dynamic effects of Forward Exchange. If spot rates are liable to be affected appreciably by Forward Exchange it proves that changes in forward rates are liable to produce far reaching economic consequences. For, by affecting spot rates they are liable to give rise to changes in the official gold and foreign exchange reserves as a result of official supporting operations, and in doing so they are liable to affect interest rates and price levels. . . . From a theoretical point of view, if spot rates are unaffected by forward dealings the effect of such dealings can well be explained by a static theory, but if spot rates are liable to be affected by forward rates in a way they would not be affected in the absence of forward facilities it is a conclusive evidence in support of the case for a dynamic theory of Forward Exchange.<sup>26</sup>

Generally, external influences will tend to push spot and forward rates in the same direction, although not necessarily to the same extent. This, however, as Einzig points out, is not always the case:

In given circumstances, however, movements in the spot rate cause the forward margin to move in the opposite sense. This is so whenever the spot rate approaches its support points and there is a high degree of confidence in the Government's ability and determination to uphold those support points. In such circumstances the forward premium or discount tends to contract as and when the spot rate is approaching its extreme limit of appreciation or depreciation.<sup>27</sup>

In many instances, however, the exchange authorities interfere in the spot market long before the spot rate approaches its limits. As a result the spot rate is maintained artificially in the close vicinity of parity while the forward margins are allowed to be affected by the influence whose effect on the spot rate was resisted. This means that in the absence of adequate changes in the spot rate any buying or selling pressure directed against both spot and forward currency affects the latter only, thereby causing a corresponding change in forward margins.

---

<sup>26</sup>Ibid., p. 237.

<sup>27</sup>Ibid., p. 238.





On the other hand, if confidence is lacking in the ability and determination of the government to maintain the support points, speculators will expect that the prevailing tendency in spot rates will continue. In this case the forward rates will tend to move towards the level at which the spot rate is expected to be by the time the forward contract matures.

In either case, therefore, the change in the spot rate can affect the forward margins substantially. For example, if the spot rate is moving towards its lower limit and there is a high degree of confidence in that limit, an intrinsic discount would narrow or an intrinsic premium would widen. However, if speculators were not confident that this limit would be maintained, an intrinsic discount would widen and an intrinsic premium would narrow. This relationship will be analyzed in much greater depth in Chapter II of this study.

These changes in forward margins, however, can, in turn, affect the spot rates. For example, if under conditions of confidence the spot rate is falling towards its lower support point, the intrinsic discount will narrow or an intrinsic premium will appear. This will stimulate inward arbitrage flows, which cause an appreciation of the spot rate. If, on the other hand, confidence is lacking in the lower support point, the intrinsic discount would widen and outward arbitrage would occur. This, of course, would cause a further depreciation of the spot rate. In addition the change in the forward margin could affect the extent to which spot transactions are used in preference to forward transactions for covering, hedging and speculation, thereby affecting the spot rate directly.

#### D. The Dynamic Approach

The analysis of the above dynamic aspects of forward exchange



destroys the idea that forward exchange can be completely explained by means of a static theory. It has been shown that forward exchange can have disturbing effects on interest rates, spot rates and the balance of payments and that it is not always a force working toward the re-establishment of external balance in the economy. The fact that forward rates can have disturbing effects on spot rates also destroys Kindleberger's relative static theory of forward exchange. This can lead only to Einzig's conclusion that,

The existence of forward exchange facilities can and does produce profound economic disturbances of a kind that could not arise in the absence of such facilities.<sup>28</sup>

The need for a dynamic approach to forward exchange rests on the possibility that intrinsic premiums or discounts are able to arise and persist; which in turn depends on the limited supply of funds that are available for interest arbitrage operations. If the funds available for interest arbitrage were unlimited the forward rates would automatically and instantaneously adjust to their interest parity values in the wake of any disturbance and the conclusions of the static theory would be valid. In reality, however, arbitrage funds are not unlimited and as a result arbitrage flows do take place between financial centres with all of their effects on interest rates, spot rates, and the balance of payments. These effects can, of course, either push the system away from or towards a new equilibrium position depending upon the state of expectations in the market.

As a result, the dynamic theory, as Einzig points out, must explain:

---

<sup>28</sup>Ibid., p. 125.





. . . the process by which forward margins tend to remain in given circumstances in the close vicinity of their Interest Parities; the way in which they tend to depart from these parities; and the way in which they tend to return to them.<sup>29</sup>

If the supply of funds available for interest arbitrage purposes is limited, there are likely to be delays in the adjustment of the forward margins to their interest parities, after either a change in the interest parity or a deviation of the forward rate from its interest parity. This delay would give rise to an intrinsic premium or discount which in turn, would cause arbitrage flows of either a constructive or disturbing nature. Only a process type of analysis is capable of ascertaining this process of adjustment.

Under a dynamic theory, therefore, the forward exchange market can react to every sphere of the economy in either a constructive or disturbing sense, and as Einzig states:

It is the object of dynamic theory to ascertain and explain the full extent to which Forward Exchange is capable of making itself felt whether through stimulating progress or unsettling equilibrium.<sup>30</sup>

Because of its inherent dynamism, forward exchange can have either constructive or disturbing effects upon an economy. This, of course, opens the door to the possibility of improving the system by means of official intervention in the forward market. This intervention would be aimed at curtailing the disturbing effects and at the same time improving its constructive effects. The role of official intervention as a policy weapon, however, is still very much in dispute and considerable controversy, especially with regard to its use in the defense of a currency against an unwanted depreciation or appreciation, has arisen in the forward

---

<sup>29</sup>Ibid., p. 276.

<sup>30</sup>Ibid., p. 278.





exchange literature. Although this controversy is of considerable importance, it is beyond the scope of this study and will not be considered in any great detail.

A laissez-faire attitude towards the forward exchange market may be acceptable under the static theory where forward margins are always determined by their interest parities, but once the reciprocal relationship between interest parities and forward rates is realized, the monetary authorities cannot ignore forward exchange in their policy decisions. This is the difference in policy decisions according to whether they are based on a static or a dynamic theory of forward exchange.

There are two schools of thought with regard to the use of forward exchange intervention. One is content with preventing the dynamic effects of forward exchange from producing their disturbing effects on the economy, while the other aims at achieving the dynamic effects in a constructive sense. If a currency is under downward pressure, the first school would recommend intervention in the forward market in order to avoid Bank rate changes, to squeeze speculators, to divert pressure from the spot exchange, or to avoid depletion of the foreign exchange reserves. This intervention would be aimed at preventing the development of an intrinsic discount and hence at preventing outward arbitrage movements that would increase the downward pressure on the currency. The second school, on the other hand, would suggest that the forward rate be pushed to an intrinsic premium in order to encourage inward arbitrage flows which would relieve the downward pressure on the currency. In other words, the first approach is to attempt to reduce the speculative pressure and prevent any disturbing arbitrage flows from arising, while the second approach is to offset the speculative pressure by encouraging constructive



arbitrage flows and thereby increasing confidence in the currency.

The success of official intervention in either of the above approaches depends, as Einzig points out, on the state of expectations in the foreign exchange market:

Anybody advocating or opposing official operations for the purpose of influencing the flow of international short-term funds must make it clear whether he has in mind operations during relatively calm periods or at times when there is a strong wave of distrust in the currency.<sup>31</sup>

If there is strong speculation against a currency, and especially if there is considerable justification for the expectations of speculators, forward intervention could probably, at best, only delay an inevitable devaluation of the currency and would be relatively ineffective in preventing the disturbing effects of forward exchange. In calmer periods, however, and in periods when there is very little justification for pessimistic views on the part of speculators, forward intervention could be effective in preventing the disturbing effects and could even encourage the constructive effects of forward exchange.

In order to use forward exchange intervention as a policy weapon, therefore, it is necessary to know the state of expectations in the foreign exchange market and, in particular, to know whether they are of a stabilizing or destabilizing nature. This is a problem common to all foreign exchange policy and it would be very helpful if some indicator of the degree of confidence in the foreign exchange market could be developed. Since, according to the dynamic approach, intrinsic premiums or discounts on a forward currency can develop and persist under conditions of speculation, it would appear that the behaviour of the intrinsic premium or discount could give some indication of the state of expectations in the

---

<sup>31</sup>Ibid., p. 389.





foreign exchange market. This possibility will be explored rigorously in the next chapter.



## CHAPTER 2

### THE NATURE AND CAUSES OF INTRINSIC PREMIUMS AND DISCOUNTS

In the previous chapter it was shown that the presence of dynamic influences resulting from forward exchange operations and the need for a dynamic theory of forward exchange to explain these influences depends on the ability of intrinsic premiums or discounts to develop and persist. It was also pointed out that these intrinsic premiums or discounts resulted from the failure of covered interest arbitrage to offset one-sided pressure on the forward exchange market--that is, the supply of or demand for forward exchange as a result of arbitrage operations was not sufficient to restore the forward rate to its interest parity value after it had been pushed to an intrinsic premium or discount by one-sided pressure usually involving some form of speculation. In order to explain the behaviour of intrinsic premiums or discounts, therefore, it would be wise to break the different types of forward exchange operations down into arbitrage and speculative components and then analyze the interaction of the arbitrage supply of and demand for forward exchange and the speculative supply of and demand for forward exchange.

Since speculation is one of the main causes of persistent intrinsic premiums or discounts, it would appear that the intrinsic premium or discount could be an indicator of the degree of confidence in the foreign exchange market. The forward rate itself gives a rough estimate of the



expectations of speculators but it seems reasonable to assume that the intrinsic premium or discount would give a more sensitive and accurate indication of the state of expectations in the foreign exchange market. In particular it would be useful if the behavior of the intrinsic premium or discount could indicate whether the speculative pressure on a currency was of a stabilizing or destabilizing nature. In order to explore this possibility we are going to employ a model developed by B. Reading<sup>1</sup> in his study of the forward pound from 1951 to 1959. This chapter will be concerned with the development of this model while in the following sections of the study we will attempt to test the model by applying it to the Canadian experience during a five year period surrounding the devaluation of the Canadian dollar in May 1962.

#### A. The Assumptions of the Model

In this model a two country (the United States and Canada)--two currency (the United States dollar and the Canadian dollar) situation will be assumed. In addition it will be assumed that only two interest rates (the United States 3 month treasury bill rate and the Canadian 3 month treasury bill rate) and one forward rate (the 3 month forward rate) exist. It will also be assumed that the interest rates are held constant and that both countries are operating under a fixed exchange rate system, with the authorities operating only in the spot market.

By definition Canadian dollars are sold spot for United States dollars when the currencies are exchanged immediately upon the completion of the deal and are sold forward for United States dollars when the currencies are exchanged after some stipulated period of

---

<sup>1</sup>Reading, op. cit., pp. 304 - 19.





time (in this case 3 months) has elapsed from the time the parties entered the contract. The Canadian spot rate will be defined as the number of United States dollars received for one Canadian dollar spot and the forward rate will be the number of United States dollars received for one Canadian dollar three months forward. The forward rate will also be expressed in the form of a discount or premium with respect to the spot rate and in particular will be expressed as a per cent per annum of the spot rate.

The interest parity value of the forward Canadian dollar will be defined as that value of the forward Canadian dollar which, when expressed as a per cent per annum of the spot rate, is equal to the difference between the Canadian and United States three month treasury bill rates. If the Canadian three month interest rate is higher than the United States rate, the forward Canadian dollar will have to be at a discount to equal its interest parity value. If the United States three month interest rate is higher, it will be at a premium. The intrinsic discount or premium on the forward Canadian dollar will be the difference between the actual forward rate and its interest parity value. If the actual forward rate is higher the forward Canadian dollar is at an intrinsic premium; if it is less, there is an intrinsic discount.

#### B. The Types of Demand and Supply of Forward Exchange

We now want to look at the forward exchange market and attempt to fit the various types of demand and supply of forward exchange into two supply-demand schedules--the arbitrage supply-demand schedule and the speculative supply-demand schedule.

There are basically four types of operations that give rise to a demand for or supply of forward exchange. These operations are



speculation, interest arbitrage, commercial covering and hedging-- each of which will now be analyzed in detail.

### 1. Speculation

"Speculation in the forward market involves the sale of a currency forward with the intention of purchasing it, spot or forward, at a later date in order to meet the forward contract; or the purchase of a currency forward with the object of selling it again (spot or forward)."<sup>2</sup> Therefore, if a speculator sells currency forward at a given forward rate, a speculative profit is made if the spot rate falls below the forward rate by the time the forward contract matures. In the case of a purchase of forward currency, a profit is made if the spot rate rises above the forward rate. For example, if the forward rate is C \$ 1 = U.S. \$. 925 and a speculator sells Canadian dollars forward at this rate, he must be able to buy Canadian dollars spot at a lower rate, say C \$ 1 = U.S. \$. 920, at the time the forward contract matures in order to make a profit. If he buys Canadian dollars forward at this rate, then he must be able to sell them spot three months at a higher rate, say C \$ 1 = U.S. \$. 930, in order to profit from the transaction.

Now, if a speculator is speculating on the expectation of a given devaluation of the spot Canadian dollar, he will sell Canadian dollars forward expecting to be able to buy the spot Canadian dollars in three months' time for fewer United States dollars than he received for them. Therefore, given the spot rate and the expected devaluation, the lower the forward rate, the smaller the profit from a speculative sale of forward Canadian dollars if the devaluation does occur or the greater the

---

<sup>2</sup>Ibid., p. 305.





loss if there is no devaluation. As an illustration assume that the spot rate is C \$ 1 = U.S. \$.925 and that the Canadian dollar is expected to devalue to C \$ 1 = U.S. \$.900. Now if the forward rate is C \$ 1 = U.S. \$.920 the speculator would gain U.S. \$.020 if devaluation occurs and would lose U.S. \$.005 if devaluation fails to occur. However, if the forward rate is lower, say C \$ 1 = U.S. \$.910, the speculator would only gain \$ U.S. \$.010 upon devaluation but would lose U.S. \$.015 if devaluation does not take place. As a result, the lower the forward rate, the smaller the profit from a given devaluation and the greater the loss if no devaluation takes place.

Under these conditions, therefore, as the forward rate moves lower and lower, speculators will sell fewer and fewer Canadian dollars forward. As a result, the lower the forward rate, the smaller the supply of forward Canadian dollars for speculation. By the same reasoning, the higher the forward rate, the greater the supply of forward Canadian dollars for speculation.

Now, consider the case of speculation on the expectation that the currency will not be devalued. In this case speculators would want to buy forward Canadian dollars in the hope that they could sell them in three months' time at a higher rate than the forward rate. Therefore, given the spot rate, the lower the forward rate, the greater the profit if the Canadian dollar does not devalue and the smaller the loss if a given devaluation does occur. As an example, assume that the spot rate is expected to remain at C \$ 1 = U.S. \$.925. Now, if the forward rate equalled C \$ 1 = U.S. \$.910, a profit of U.S. \$.015 would be made if no devaluation occurred and a loss of U.S. \$.010 would be suffered if the Canadian dollar devalued to U.S. \$.900. However, if the forward rate were lower, say C \$ 1 = U.S. \$.905, the profit if no devaluation took



place would be U.S. \$.020 while the loss if a devaluation to U.S. .900 did occur would only be U.S. \$.005.

Therefore, under these conditions the lower the forward rate, the more forward Canadian dollars would be demanded by speculators and, hence, the greater the speculative demand for forward Canadian dollars. Conversely, the higher the forward rate, the smaller the speculative demand for forward Canadian dollars.

Reading defines the net speculative supply of, or demand for, forward currency as "the surplus speculative supply or demand after speculative sales have been matched as far as possible by speculative purchases."<sup>3</sup> Therefore, if we start with a very high forward rate, given the spot rate, there will be a net speculative supply of forward Canadian dollars. As the forward rate falls the net speculative supply also falls until a forward rate is reached at which there is no net speculative supply or demand. When the forward rate falls below this value a net speculative demand appears, and the lower the forward rate falls, the greater the net demand will become. As a result the net speculative demand for, or supply of, forward exchange depends upon the level of the forward rate--the higher the forward rate the greater the net speculative supply and the lower the forward rate the greater the net speculative demand. This situation is illustrated by the speculative supply-demand schedule ( $S^1S^1$ ) in Figure 1.

## 2. Interest Arbitrage

"The interest arbitrageur uses the forward market to obtain a safe profit. In order to take advantage of higher interest rates in another country, it is necessary to obtain that country's currency. The

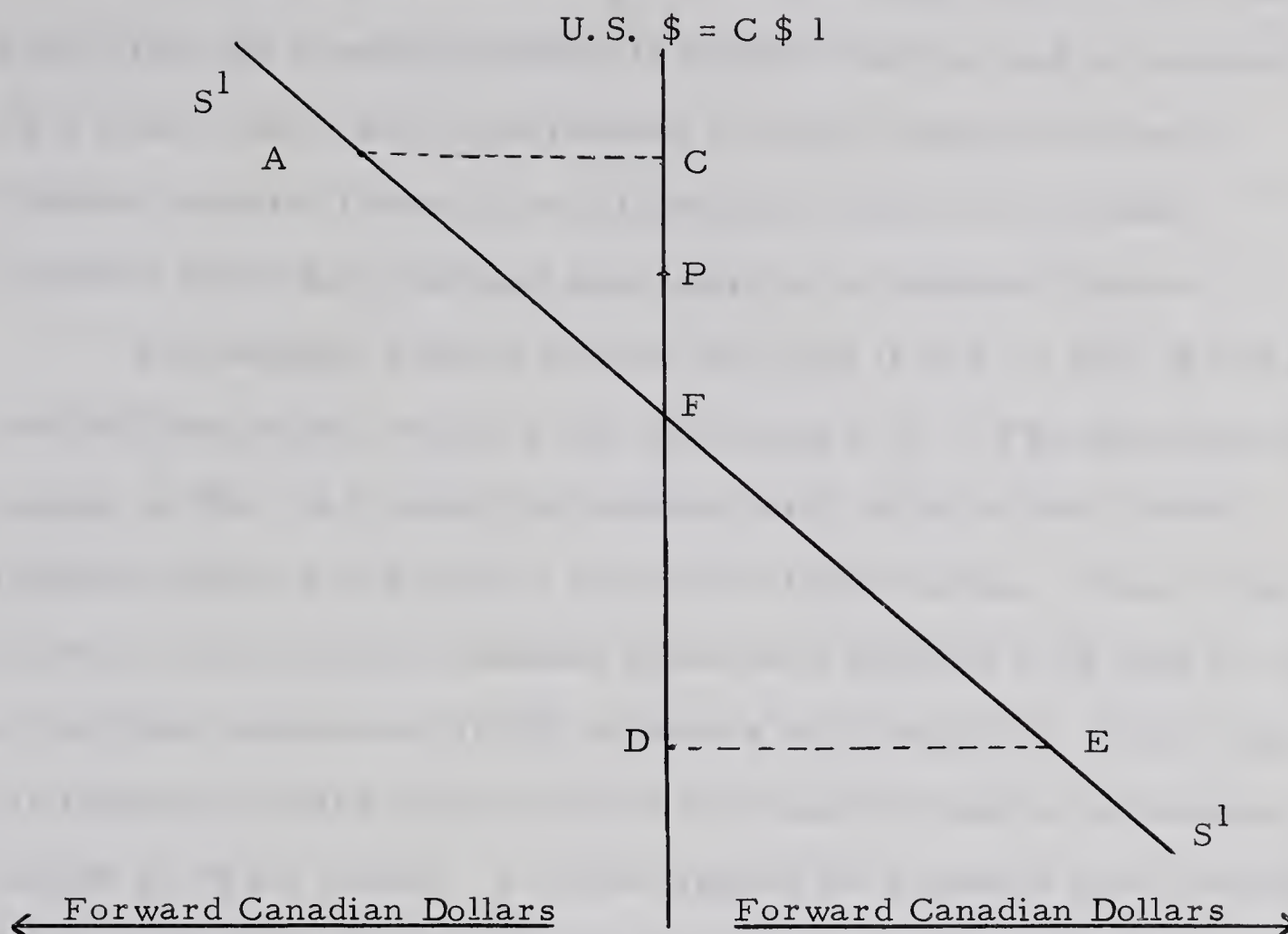
---

<sup>3</sup>Ibid., p. 305.





FIGURE 1



$P$  = the spot rate

$F$  = the value of the forward rate at which there is neither a net speculative supply nor demand for forward Canadian dollars.

$S^1 S^1$  = the net speculative supply-demand schedule for forward Canadian dollars.

$AC$  = the net speculative supply of forward Canadian dollars at a forward rate of  $C$ , that is, at a forward premium of  $CP$ .

$DE$  = the net speculative demand for forward Canadian dollars at a forward rate of  $D$ , that is, at a forward discount of  $DP$ .

gain from the higher interest rate is then liable to be offset, in part or completely, by the loss which results if the foreign currency is devalued. To cover against this possibility the arbitrageur sells forward the currency he purchases spot. He will be willing to do this so long as the





cost of covering is less than the gain from the higher interest; or the profit from the forward purchase is greater than the loss of interest."<sup>4</sup>

As a result, there will be an interest arbitrage supply of forward Canadian dollars if there is an intrinsic premium on the forward Canadian dollar and a demand when there is an intrinsic discount.

For example assume that the spot rate is C \$ 1 = U.S. \$.925 and that the three month treasury bill rate in the U.S. is 2%; while that in Canada is 3%. As a result the interest parity value of the forward Canadian dollar would equal a discount of 1% per annum. Now, if the discount on the forward Canadian dollar only equalled 1/2% (that is, at an intrinsic premium of 1/2%), investors would sell U.S. dollars spot for Canadian dollars spot and invest the Canadian dollars so obtained in Canada at 3% per annum. To cover against the exchange risk involved they would sell the Canadian dollar proceeds of this short-term loan forward. Since the forward Canadian dollar is at a discount of 1/2% per annum, this covering operation would cost the investor 1/2% per annum--leaving him a net yield of 2-1/2% per annum which is greater than the 2% that could be earned in the United States. As a result there will be an arbitrage supply of forward Canadian dollars if the forward rate is at an intrinsic premium.

If, however, the forward Canadian dollar was at a discount of 1-1/2% per annum (that is, at an intrinsic discount of 1/2%), investors would sell Canadian dollars spot for United States dollars spot and invest the United States dollars in the United States at 2% per annum. They would then buy Canadian dollars forward (that is, sell United States dollars forward) at a discount of 1-1/2% per annum. This would give a net yield of 3-1/2% per annum which is higher than the 3% yield that

---

<sup>4</sup>Ibid., p. 306.



could be earned by investing Canadian dollars in Canada. This operation would, therefore, result in an arbitrage demand for forward Canadian dollars--as long as the forward Canadian dollar was at an intrinsic discount. In conclusion then, the higher the intrinsic premium on the forward Canadian dollar, the greater the arbitrage supply of forward Canadian dollars; and the higher the intrinsic discount, the greater the arbitrage demand.

In reality, however, the supply of, or demand for, forward Canadian dollars would rise only slowly as the intrinsic premium or discount rises from 0 to 1/2% per annum because the complicated transactions are not worthwhile for a return of less than 1/2% per annum.<sup>5</sup> Once the intrinsic premium or discount reaches approximately 1/2% per annum the supply of or demand for forward Canadian dollars becomes perfectly elastic as nearly all the funds available for interest arbitrage are used. As the intrinsic premium or discount rises above 1/2% per annum the supply-demand schedule becomes inelastic again and the intrinsic premium or discount would have to rise to 2 - 3% before substantial new funds could be obtained for interest arbitrage. This situation can be illustrated by the arbitrage supply-demand schedule ( $A^1A^1$ ) drawn in Figure 2.

### 3. Commercial Covering

Traders who are to receive or make payments in a foreign currency may act in any one of three ways:

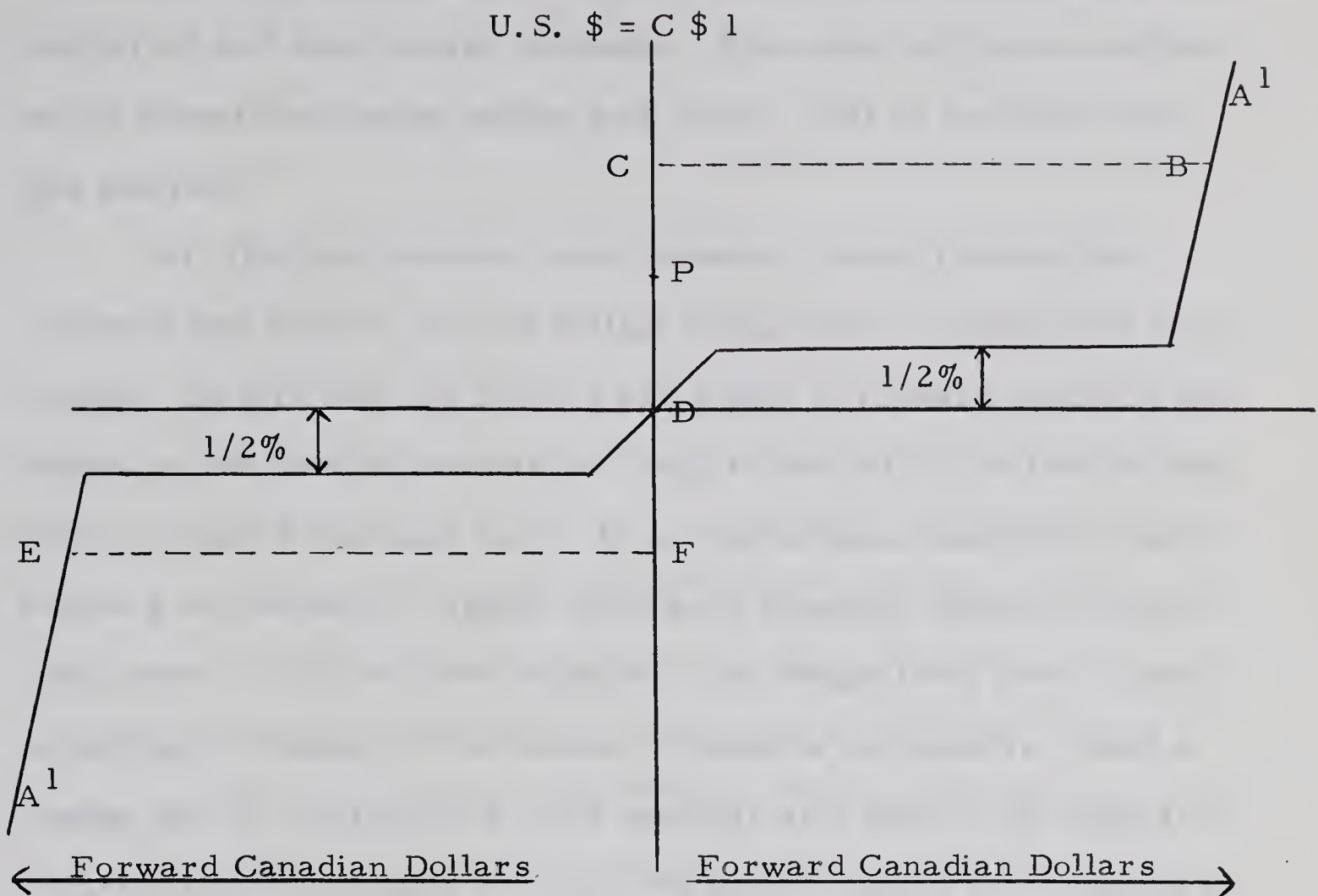
---

<sup>5</sup>Einzig, op. cit., p. 169, disagrees that this factor limits the flow of arbitrage funds. In fact he suggests that large arbitrageurs, especially banks, will operate on much smaller margins and, at times, even at a loss. For the purposes of this study, however, since there does not seem to be any agreement on a minimum operating margin, the 1/2% minimum will be used.





FIGURE 2



P = the spot rate

D = the interest parity value of the forward rate (since D is below P the Canadian interest rate must be higher than the United States interest rate)

A<sup>1</sup> A<sup>1</sup> = the net interest arbitrage supply-demand schedule for forward Canadian dollars

EF = the net interest arbitrage demand for forward Canadian dollars at a forward rate of F (that is, at an intrinsic discount of DF)

CB = the net interest arbitrage supply of forward Canadian dollars at a forward rate of C (that is, at an intrinsic premium of DC)



(a) They may always wait until the payment or receipt is due and buy or sell spot foreign exchange. This case will have no effect on the forward exchange market and, hence, will be excluded from this analysis.

(b) They may always cover forward, buying forward the currency they have to pay and selling forward the currency they are to receive. In this case the demand and supply of forward currency will depend on the level of imports and exports and not on the level of the spot or forward exchange rate. At any given time, therefore, there will be a net demand or supply of forward Canadian dollars for automatic cover. This amount, however, can change from time to time according to changes in the volume of imports and exports. Such a change will be incorporated in the analysis as a shift to the right (in the case of a net demand) or to the left (in the case of a net supply) of the net speculative supply-demand schedule ( $S^1S^1$ ). For any particular  $S^1S^1$  schedule, therefore, it is assumed that the volume of automatic covering is fixed.

(c) They may sometimes cover in the forward market and sometimes not cover. This is the usual situation and it results in two separate cases:

( i ) Those who always cover, but choose between the forward and spot market according to which is cheaper. If a Canadian importer covers in the spot market, he will sell Canadian dollars spot for United States dollars spot and will hold the United States dollars until a United States dollar payment falls due. This operation costs the importer either the interest he could have obtained by lending Canadian dollars in Canada or the interest he has to pay to





borrow the Canadian dollars that he sells spot, less the interest he earns on those United States dollars that he holds and invests in the United States. If this cost is less, or the profit greater, than that which results from buying United States dollars (selling Canadian dollars) forward, the importer will cover in the spot exchange market. A Canadian importer, therefore, will buy United States dollars (sell Canadian dollars) spot when the forward Canadian dollar is at an intrinsic discount, and will buy United States dollars (sell Canadian dollars) forward when the forward Canadian dollar is at an intrinsic premium. Conversely, a Canadian exporter will sell United States dollars (buy Canadian dollars) forward when there is an intrinsic discount on the forward Canadian dollar and will sell United States dollars (buy Canadian dollars) spot when there is an intrinsic premium.

For example assume that the Canadian three-month interest rate is equal to 3% per annum while that of the United States is only 2%. A Canadian importer, therefore, could cover his exchange risk by borrowing Canadian dollars at 3%, selling them spot for United States dollars and investing the United States dollar proceeds in the United States at 2%. This would give a net cost of covering in the spot market of 1% per annum. On the other hand, a Canadian exporter could cover by borrowing United States dollars at 2%, selling them spot for Canadian dollars, and investing the proceeds





at 3% in Canada--giving a net gain on the covering operation of 1%. If the forward Canadian dollar, however, was at an intrinsic discount (in this case at a discount greater than 1% per annum), the cost of covering for the importer by selling Canadian dollars forward would be greater than 1%; hence the importer would cover in the spot market. If the forward Canadian dollar was at an intrinsic premium (that is at a discount of less than 1%), the cost of covering in the forward market would be less than 1% and the importer would cover by selling forward Canadian dollars (buying forward United States dollars). In the case of the exporter, he would gain less than 1% if he covered by buying Canadian dollars forward in the case of an intrinsic premium and hence, would cover in the spot market. If, however, there was an intrinsic discount, he would gain more than 1% by buying forward Canadian dollars and would, therefore, cover in the forward market.

As a result, when the forward Canadian dollar is at an intrinsic premium this type of behavior on the part of traders would give rise to a net supply of forward Canadian dollars. Conversely, an intrinsic discount would give rise to a net demand for forward Canadian dollars on the part of traders. Since the demand and supply of forward Canadian dollars depends on the intrinsic discount or premium, this type of behavior is similar to covered interest arbitrage and is often called "trader arbitrage." As a result the supply of and demand for forward exchange under those circumstances can be included in the net interest arbitrage supply-demand



schedule ( $A^1A^1$ ), which will now be referred to as AA. In this study it will be assumed that this additional supply and demand will not change the shape of the  $A^1A^1$  schedule.

(That is, trade arbitrage will be assumed to behave in exactly the same manner as covered interest arbitrage).

(ii) Traders who sometimes cover forward and at other times do not cover at all. The demand for and supply of forward exchange under these circumstances will be influenced by the same factors as the demand and supply under conditions of speculation. This type of behavior, therefore can be called "trader speculation" and can be included in the net speculative supply-demand schedule ( $S^1S^1$ ) which will now be referred to as the SS schedule.

As can be seen from the above analysis, therefore, the demand for and supply of forward exchange resulting from commercial covering operations are influenced by the same factors that influence the speculative and arbitrage demand for, and supply of, forward exchange. As a result, all commercial covering operations that affect the forward market can be included in either the net speculative supply-demand schedule or the net arbitrage supply-demand schedule. Thus we are left with only two net supply-demand schedules for forward exchange.

#### 4. Hedging

If a United States holder of Canadian dollar assets wishes to cover against a fall in the United States dollar value of those assets resulting from a depreciation of the Canadian dollar, he must enter into a hedging operation. In doing this, he may either sell Canadian dollars forward or borrow Canadian dollars, sell them spot for United States





dollars, and invest the proceeds in the United States. If he sometimes covers forward and sometimes spot, his choice depends on the intrinsic discount or premium, just as in the case of a "trader arbitrageur." As a result, this type of hedging can be included in the net arbitrage supply-demand schedule (AA) for forward exchange. If the hedger only sometimes covers forward, he may be regarded as a speculator and his supply of, or demand for, forward exchange may be included in the net speculative supply-demand schedule (SS). As a result, hedging operations may be included in either the net speculative or net arbitrage supply-demand schedules for forward exchange. The four types of supply and demand for forward exchange, therefore, can be fitted into two net supply-demand schedules:

- (1) the net arbitrage schedule (AA) influenced by the intrinsic discount or premium on the forward currency;
- (2) the net speculative schedule (SS) influenced by the forward rate and the expected spot rate.

The actual forward rate at any given time is determined by the intersection of these two net supply-demand schedules.

### C. The Effects of Stabilizing and Destabilizing Speculation

In order to determine whether or not the behaviour of the intrinsic premium or discount can be used as a guide to the state of confidence in the foreign exchange market, the effects of the expectations of speculators on the behaviour of the intrinsic premium or discount must be determined. In particular the effects of stabilizing and destabilizing speculation must be analyzed before any definite conclusion with regard to this proposal can be provided.

Let us assume that the country in question (Canada) is operating



under a fixed or pegged exchange rate system. In these circumstances speculators may behave in two different ways:

- (1) as if they expected the spot rate to move beyond one of its limits; that is, in the expectation of a devaluation or appreciation;
- (2) as if they did not expect the limits to be breached; that is, under conditions of confidence in the limits.

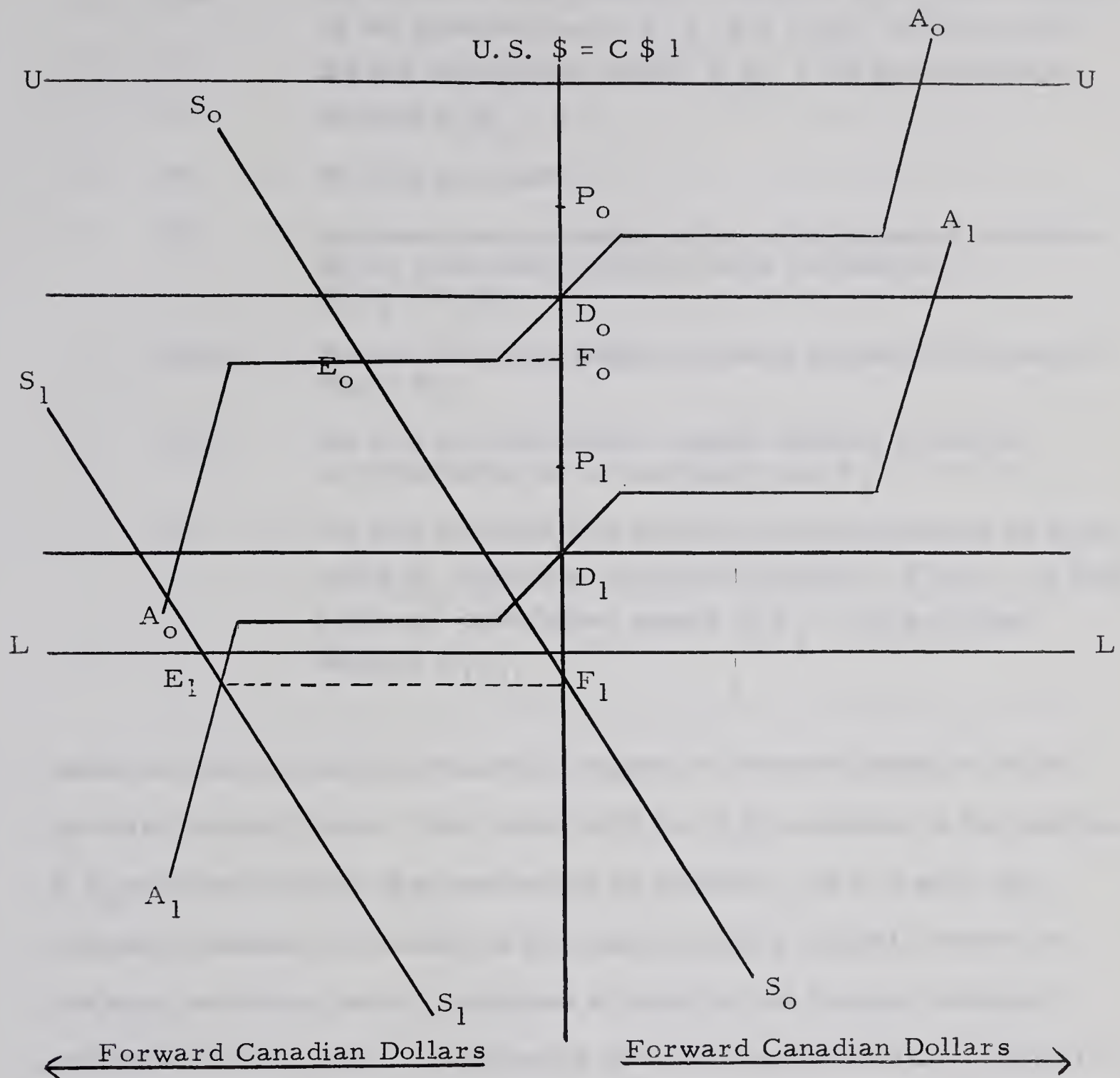
If a devaluation is anticipated by speculators, there will be a supply of forward Canadian dollars at a forward rate below the lower limit of the spot rate; that is, speculators will sell forward Canadian dollars in expectation of a fall in the spot rate below its lower limit. But as the forward rate falls farther below the limit the profit from any given expected devaluation would be less and the loss from the failure of a devaluation to occur would be greater; and, hence, speculators would sell fewer Canadian dollars forward, thereby decreasing the supply. On the other hand if speculators are reasonably sure that a devaluation will occur there will be little demand for forward Canadian dollars at forward rates below the lower spot limits. This demand, however, will increase as the forward rate falls toward or below the expected future spot rate. This same analysis can be applied in reverse to the case of an expected appreciation of the spot rate above its upper limit. Therefore, the net speculative demand for forward Canadian dollars increases with a fall of the forward rate below the lower spot limit and the supply increases for a rise in the forward rate above the upper spot limit. This situation is represented by the net speculative supply-demand schedules ( $S_O S_O$ ) in Figure 3.

Now in the case of destabilizing speculation a fall in the spot rate would give rise to increased expectations of a further fall in the spot rate. This would give rise to an increased volume of speculative forward





FIGURE 3



$P_0$  = the initial spot rate

$D_0$  = the initial interest parity value of the forward Canadian dollar

UU = the upper spot limit

LL = the lower spot limit

$A_0 A_0$  = the net arbitrage supply-demand schedule corresponding to  $D_0$

$S_0 S_0$  = the net speculative supply-demand schedule corresponding to  $P_0$





- $F_o$  = the forward rate (intrinsic discount  $F_o D_o$  determined by the intersection of  $A_o A_o$  and  $S_o S_o$ . At this point the net speculative supply  $F_o E_o$  = the net arbitrage demand  $F_o E_o$ .
- $P_1$  = the new spot rate.
- $D_1$  = the new interest parity value of the forward Canadian dollar (assuming interest rates unchanged i.e.  $P_o D_o = P_1 D_1$ ).
- $A_1 A_1$  = the net arbitrage supply-demand schedule corresponding to  $D_1$ .
- $S_1 S_1$  = the new net speculative supply-demand schedule corresponding to the new spot rate  $P_1$ .
- $F_1$  = the new forward rate given by the intersection of  $A_1 A_1$  and  $S_1 S_1$  (giving an intrinsic discount =  $F_1 D_1$ ). At this point net speculative supply  $E_1 F_1$  = net arbitrage demand  $E_1 F_1$ .

sales and hence would increase the supply of forward Canadian dollars at every forward rate. This would shift the  $S_o S_o$  schedule to the position  $S_1 S_1$  and the intrinsic discount would be widened. As a result, the intrinsic discount will widen as the spot rate falls and will narrow as the spot rate rises under conditions of doubt in the foreign exchange market--that is, under conditions of destabilizing speculation. This is illustrated in Figure 3 by the widening of the intrinsic discount from  $F_o D_o$  to  $F_1 D_1$  as the spot rate falls from  $P_o$  to  $P_1$ .

On the other hand, if there is no expectation of a spot rate fall below the lower limit there will be no speculative supply of forward Canadian dollars at forward rates below the lower limit. There will, however, be a large speculative demand at forward rates below the lower limit and, hence, they could make a profit by buying forward Canadian dollars at forward rates below this limit. As a result the net speculative



supply-demand schedule becomes perfectly elastic to falls in the forward rates approaching and passing the lower spot limit. Similarly, the speculative supply of forward Canadian dollars becomes perfectly elastic for forward rates approaching and above the upper spot limit. This situation is illustrated by the SS schedule in Figure 4.

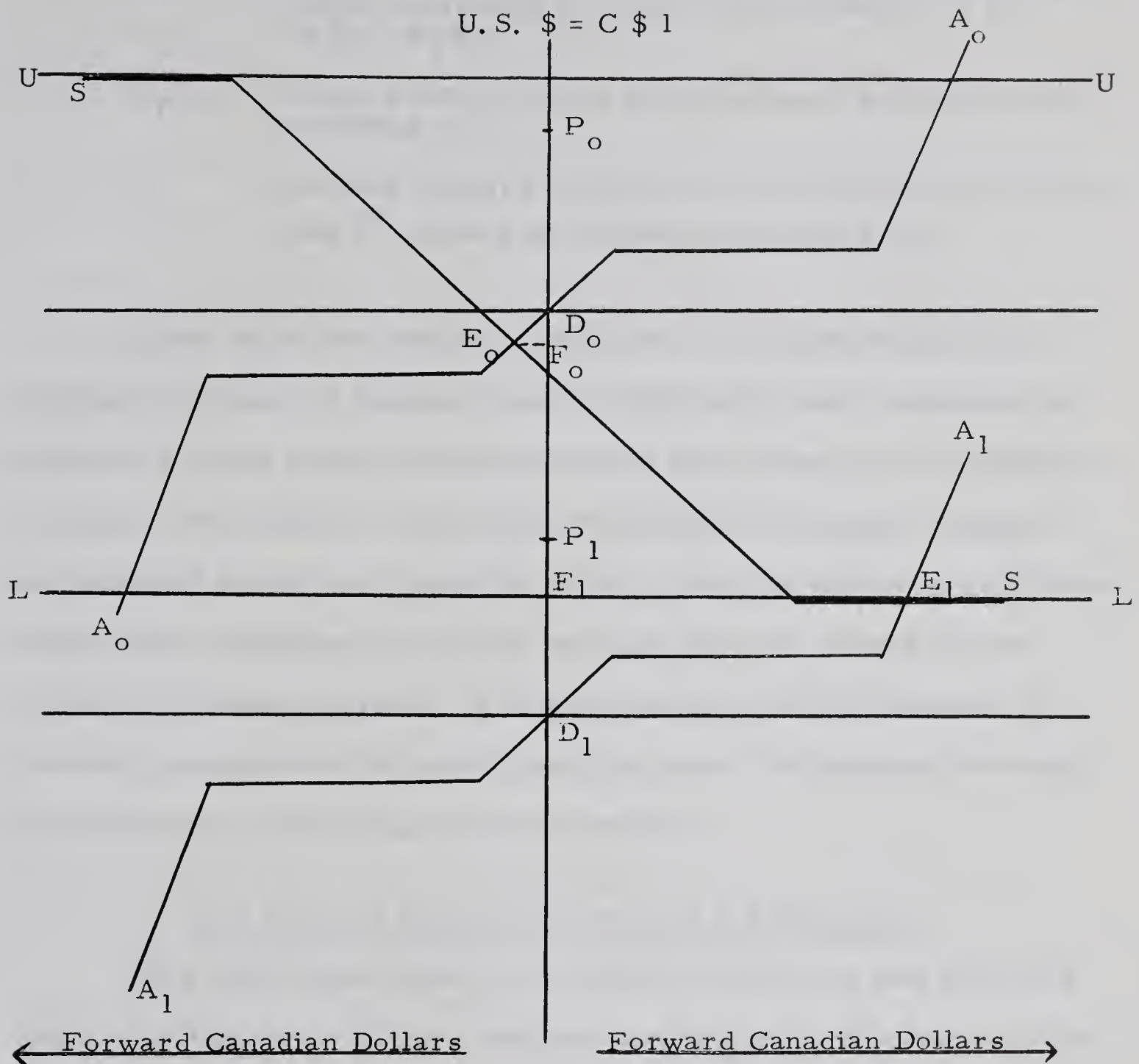
In this case, since speculators have confidence in the upper and lower spot limits, their speculation will be stabilizing in nature and a movement in the spot rate will give rise to expectations of a subsequent movement in the opposite direction. As a result, there will still be a perfectly elastic demand for forward exchange at forward rates approaching or below the lower spot limit and, hence, the SS schedule will not shift with a movement in the spot rate.

If the interest parity, therefore, dictates a forward rate below the rate at which the demand for forward Canadian dollars becomes perfectly elastic (i. e. below the lower spot limit), an intrinsic premium is produced and, if it dictates a forward rate above the level at which the supply becomes perfectly elastic, an intrinsic discount develops. This means that under conditions of confidence, an intrinsic discount will narrow or change to an intrinsic premium as the spot rate falls toward its lower limit and that an intrinsic premium narrows or changes to an intrinsic discount as the spot rate rises toward its upper limit. This is illustrated in Figure 4 by the fact that the intrinsic discount  $F_0 D_0$  changes to an intrinsic premium  $F_1 D_1$  as the spot rate falls from  $P_0$  to  $P_1$ .





FIGURE 4



$P_0$  = the initial spot rate

$D_0$  = the initial interest parity value of the forward Canadian dollar

SS = the net speculative supply-demand schedule (completely elastic at the upper and lower spot limits)

$A_0 A_0$  = the initial net arbitrage supply-demand schedule corresponding to  $D_0$

$F_0$  = the initial forward rate given by the intersection of  $A_0 A_0$  and SS--giving an intrinsic discount of  $F_0 D_0$

$P_1$  = the new spot rate



- $D_1$  = the new interest parity value of the forward Canadian dollar (assuming interest rates unchanged, i.e.  $P_0 D_0 = P_1 D_1$ )
- $A_1 A_1$  = the new net arbitrage supply-demand schedule corresponding to  $D_1$
- $F_1$  = the new forward rate given by the intersection of  $A_1 A_1$  and  $S^S$  -- giving an intrinsic premium  $F_1 D_1$

From the above analysis, therefore, it is apparent that the intrinsic premium or discount behaves differently under conditions of confidence in the foreign exchange market than it does under conditions of doubt. For instance, as the spot rate falls, an intrinsic discount narrows and an intrinsic premium widens under conditions of confidence, while under conditions of doubt an intrinsic discount widens and an intrinsic premium narrows. It is apparent then that the behavior of intrinsic premiums or discounts does give some indication of the state of confidence in the foreign exchange market.

#### D. The Types of Intrinsic Premiums and Discounts

This differential behavior of intrinsic premiums and discounts under conditions of confidence and non-confidence led Reading to define two types of intrinsic premiums and discounts:<sup>6</sup>

(1) "An intrinsic premium associated with a spot-rate rise and a discount with a fall. The premium tends to disappear with a spot-rate fall and the discount with a rise. I shall call these 'Doubt' intrinsic premiums and discounts."

(2) "An intrinsic premium associated with a fall in the spot-rate and a discount with a rise. The premium tends to disappear

---

<sup>6</sup>Reading, op. cit., p. 312.





with a spot-rate rise and the discount with a fall. I call these 'confidence' premiums and discounts."

The significance of this classification is that it would appear to provide a method of determining the state of confidence in the foreign exchange market and whether or not speculation is liable to be of a stabilizing or destabilizing nature. For example, if, while the spot-rate is falling, the intrinsic discount is narrowing or the intrinsic premium is widening, it would indicate that speculators have confidence in the ability of the authorities to maintain the spot-rate within its upper and lower limit. Hence, it could be anticipated that speculation would be of a stabilizing nature. If, on the other hand, the intrinsic discount was widening or the intrinsic premium was narrowing as the spot rate fell, it would indicate that speculators anticipate a further fall in the spot rate; and, hence speculation would be destabilizing. If this model were valid in the real world it could be a very useful tool for the authorities in determining the type of speculative pressure being exerted on a currency. In the next section this validity will be tested by applying the model to the Canadian experience from 1959 to 1964.

#### E. The Usefulness of the Model

In order to be useful any model must approximate as closely as possible the conditions that exist in the real world. In order to increase the realism of the above model, therefore, we will now remove the major simplifying assumptions made at the beginning to see what effect their removal will have on the results obtained above.

In the model a two country - two currency situation was assumed. This assumption, however, does not limit the usefulness of the model since it could be readily extended to the multi-country - multi-currency





case which exists in the real world. Although this extension would introduce many complications it would not materially affect the results obtained from the simpler two country - two currency case. The removal of this assumption, therefore, would not affect the validity and usefulness of the model.

A more serious qualification to the model was the assumption that the two countries involved both operated under a fixed exchange rate system. Since this assumption is not necessarily in conformity with the real world, and particularly since the period of Canadian experience to be analyzed involves both a fixed and flexible exchange rate system, the effects of the removal of this assumption must be examined in some detail. Although they are not defined as explicitly as the limits under a fixed exchange rate system, the exchange rate does have an upper and lower limit under a flexible exchange rate system. If speculators have confidence in the appropriateness of the flexible exchange rate they will not let it rise above an implicit upper limit or fall below an implicit lower limit. Although those limits are somewhat more flexible than those under a fixed exchange rate system, they do nevertheless exist in the minds of speculators. Under conditions of non-confidence these limits disappear as they do under a fixed exchange rate system. In the case of a fixed exchange rate, if speculators anticipate that one of the limits will be breached, that limit effectively disappears as a constraint on the expectations of speculators and the fixed exchange rate system becomes in reality a flexible exchange rate system. As a result, the removal of the assumption of fixed exchange rates will not affect the usefulness of the model in any way and the model, therefore, should be valid under either system.



The assumption that is most unrealistic in the above model is the assumption that interest rates in the two countries remain constant and that the intrinsic premium or discount is affected only by changes in the spot exchange rate. This of course is not the case in the real world. For example, if the spot rate was falling, interest rates would tend to rise both because the authorities would raise them to defend their foreign exchange reserves and because any loss of reserves would tend to tighten credit automatically. The normal movement of the interest rate differential, therefore, (assuming the foreign country holds its interest rate constant) is to widen when a currency is under downward pressure and to narrow when upward pressure is being exerted. As a result, the interest parity value and the intrinsic premium or discount will be altered.

To illustrate this situation assume that the Canadian interest rate is equal to 3% and that of the U.S. is equal to 2%. The interest parity value of forward Canadian dollars, therefore, would be equal to a discount of 1% per annum. If the Canadian interest rate is now raised to 4%, the interest parity value becomes a discount of 2%. As a result, if the forward Canadian dollar had been at a discount of 1-1/2% (i.e. an intrinsic discount of 1/2%) before the interest rate change, it would now be an intrinsic premium of 1/2%. Conversely, if the forward rate had previously been at a discount of 1/2% (i.e. intrinsic premium of 1/2%) it would now be at an intrinsic premium of 1-1/2%. The effect of an increase in the interest rate (widening of the interest differential) on the behavior of the intrinsic premium or discount re-enforces the effect of a fall in the spot rate under conditions of confidence in the foreign exchange market. Under conditions of non-confidence, the widening of the interest rate differential would oppose the movement of the intrinsic premium or discount that would result from a fall in the spot rate.







The normal movement of the interest differential (widening as the spot rate falls and narrowing as the spot rate rises), therefore, moves the intrinsic premium or discount in the same direction as spot rate changes under conditions of confidence in the foreign exchange market. As a result, they will not cause any difficulties for our model under these circumstances. Under conditions of doubt, however, these normal movements of the interest rate differential oppose the movements of the intrinsic premium or discount caused by spot rate changes. It is unlikely though that this would have a lasting effect under conditions of substantial destabilizing speculation since the intrinsic premium or discount would resume its previous direction of movement after the interest rate change. The only way that a widening of the interest differential could have a lasting effect under conditions of downward destabilizing speculation would be in the case where either the interest rate differential was widened continually or the expectations of speculators were changed.<sup>7</sup> If the interest rate differential was being widened continually, it would be an equally valid indicator of destabilizing speculation and non-confidence in the foreign exchange market. If, on the other hand, the expectations of speculators were changed from a state of doubt to a state of confidence, the intrinsic premium would then be operating properly as an indicator of confidence in the foreign exchange market. Therefore, changes in interest rate differentials, although they may prevent the intrinsic premium or discount from indicating

---

<sup>7</sup>A. E. Jasay, "Bank Rate or Forward Exchange Policy," Banca Nazionale del Lavoro Quarterly Review, (March, 1958), p. 66, suggests that a rise in the bank rate may have exactly the opposite effect on expectations. It may be interpreted as a last ditch stand before devaluation, in which case destabilizing speculation would increase.



mild destabilizing speculation in the foreign exchange market, will not affect the general validity of the above model under conditions in which any substantial destabilizing speculative pressures are present.

In the real world it is also probable that the foreign exchange authorities intervene in the forward market as well as in the spot market for Canadian dollars. Those operations will prevent the intrinsic premium or discount from moving freely and may not allow the model to indicate the presence or absence of confidence accurately. However, under conditions of destabilizing speculation the authorities would have to enter into an ever increasing volume of forward transactions in order to maintain a constant intrinsic premium or discount. This situation, therefore, would be an equally valid indicator of non-confidence in the foreign exchange market.

Even after the removal of the unrealistic assumptions, therefore, it would appear that this model could have general validity in the real world. In order to test this validity we will now apply the model to the Canadian experience during a five year period surrounding the May, 1962 devaluation of the Canadian dollar.



## PART II

### THE FORWARD CANADIAN DOLLAR 1959-1964





## CHAPTER 3

### THE FORWARD CANADIAN DOLLAR AND THE U.S. -CANADIAN INTEREST RATE DIFFERENTIAL 1959-1964

This chapter will involve the collection of the necessary Canadian data for testing the validity of the model developed in Chapter 2. These statistics will consist of the spot and 90 day forward exchange rates for the Canadian dollar, the Canadian three month treasury bill rate and the U.S. three month treasury bill rate--all of which will be collected monthly for the period January, 1960 to December, 1964. The choice of the three month treasury bill rates does not imply that they are the only short-term interest rates that determine the arbitrage flows between the U.S. and Canada. They were chosen on the basis of their ready availability and comparability. In addition, they are probably the most representative of the short-term interest rates that exist in each country.

The spot and forward exchange rates are used to calculate the actual forward premium or discount on the forward Canadian dollar monthly for the five year period. In addition the behaviour of the spot rate is an integral part of the analysis employed in the Reading model. The forward premium or discount on the forward Canadian dollar is expressed as a per cent per annum of the spot rate in order to facilitate the comparison of the actual forward premium or discount with the interest parity value of the forward Canadian dollar, which is also expressed



on a per cent per annum basis. This data and the calculation of the forward premium or discount as a per cent per annum of the spot rate are shown in Table 1.

The Canadian and U.S. three month treasury bill rates are employed to calculate the interest parity value of the forward Canadian dollar on a per cent per annum basis by subtracting the Canadian rate from the U.S. rate. The interest parity value is then subtracted from the actual forward premium or discount on the forward Canadian dollar, as calculated in Table 1, in order to determine the intrinsic premium or discount on the forward Canadian dollar over the five year period. These data are tabulated in Table 2.





TABLE 1

CALCULATION OF THE FORWARD PREMIUM (OR DISCOUNT)  
ON THE FORWARD CANADIAN DOLLAR AS A PER CENT  
PER ANNUM OF THE SPOT RATE, 1959-1964

Year and Month	Canadian Dollar <sup>a</sup>		Actual Forward Premium (+) or Discount (-) <sup>b</sup>	Actual Forward Premium (+) or Discount (-) as a % per annum <sup>c</sup>
	Spot Rate	90 Day Forward Rate		
	U. S. \$	U. S. \$	U. S. \$	% p. a.
1960				
January	1.0492	1.0478	- .0014	- .53
February	1.0507	1.0495	- .0012	- .46
March	1.0516	1.0504	- .0012	- .46
April	1.0385	1.0384	- .0001	- .04
May	1.0224	1.0227	+ .0003	+ .12
June	1.0180	1.0186	+ .0006	+ .24
July	1.0221	1.0216	- .0005	- .20
August	1.0311	1.0310	- .0001	- .04
September	1.0283	1.0292	+ .0009	+ .35
October	1.0220	1.0225	+ .0005	+ .20
November	1.0238	1.0229	- .0009	- .35
December	1.0179	1.0161	- .0018	- .71
1961				
January	1.0071	1.0061	- .0010	- .40
February	1.0105	1.0100	- .0005	- .20
March	1.0129	1.0128	- .0001	- .04
April	1.0112	1.0105	- .0007	- .28
May	1.0126	1.0112	- .0014	- .55
June	.9945	.9938	- .0007	- .28
July	.9670	.9666	- .0004	- .17
August	.9695	.9694	- .0001	- .04
September	.9701	.9703	+ .0002	+ .08
October	.9706	.9709	+ .0003	+ .12
November	.9655	.9663	+ .0008	+ .33
December	.9590	.9594	+ .0004	+ .17
1962				
January	.9569	.9565	- .0004	- .17
February	.9535	.9530	- .0005	- .21
March	.9529	.9529	-----	---
April	.9526	.9524	- .0002	- .08
May	.9240	.9234	- .0006	- .26
June	.9192	.9167	- .0025	-1.09
July	.9269	.9222	- .0047	-2.03
August	.9280	.9234	- .0046	-1.98
September	.9287	.9245	- .0042	-1.81
October	.9294	.9258	- .0036	-1.55
November	.9287	.9268	- .0019	- .82
December	.9294	.9280	- .0014	- .60



TABLE 1--Continued

Year and Month	Canadian Dollar		Actual Forward Premium (+) or Discount (-)	Actual Forward Premium (+) or Discount (-) as a % per annum
	Spot Rate	90 Day Forward Rate		
	U. S. \$	U. S. \$	U. S. \$	% p. a.
1963				
January	. 9284	. 9267	- . 0017	- . 73
February	. 9280	. 9262	- . 0018	- . 78
March	. 9276	. 9260	- . 0016	- . 69
April	. 9287	. 9276	- . 0011	- . 47
May	. 9283	. 9280	- . 0003	- . 13
June	. 9275	. 9276	+ . 0001	+ . 04
July	. 9262	. 9262	-----	---
August	. 9234	. 9229	- . 0005	- . 22
September	. 9261	. 9258	- . 0003	- . 13
October	. 9277	. 9278	+ . 0001	+ . 04
November	. 9280	. 9280	-----	---
December	. 9265	. 9265	-----	---
1964				
January	. 9257	. 9257	-----	---
February	. 9259	. 9258	- . 0001	- . 04
March	. 9255	. 9255	-----	---
April	. 9252	. 9253	+ . 0001	+ . 04
May	. 9252	. 9254	+ . 0002	+ . 09
June	. 9252	. 9257	+ . 0005	+ . 22
July	. 9248	. 9253	+ . 0005	+ . 22
August	. 9270	. 9265	- . 0005	- . 22
September	. 9293	. 9287	- . 0006	- . 26
October	. 9300	. 9296	- . 0004	- . 17
November	. 9312	. 9307	- . 0005	- . 21
December	. 9306	. 9303	- . 0003	- . 13

<sup>a</sup>The Canadian dollar spot rates are the monthly averages of noon rates; while the forward rates are monthly averages of approximate noon rates. These rates were converted to the U. S. Dollar Price of one Canadian Dollar.

<sup>b</sup>The forward premium (or discount) is calculated by subtracting the spot rate from the forward rate.

<sup>c</sup>The forward premium (or discount) as a per cent of the spot rate is calculated by multiplying the ratio of the forward premium (or discount) to the spot rate by 100 and then by 4 to convert it to an annual basis.

Sources:

Bank of Canada, Statistical Summary, 1963 Supplement (Ottawa: Bank of Canada, 1963).

Bank of Canada, Statistical Summary (Ottawa: Bank of Canada, monthly).





TABLE 2

CALCULATION OF THE INTEREST PARITY VALUE OF THE  
FORWARD CANADIAN DOLLAR AND THE INTRINSIC  
PREMIUM (OR DISCOUNT) ON THE FORWARD  
CANADIAN DOLLAR, 1959-1964

Year and Month	3 Month Treasury Bill Rate <sup>a</sup>		Interest Parity Value Premium (+) or Discount (-) <sup>b</sup>	Actual Forward Premium (+) or Discount (-)	Intrinsic Premium (+) or Discount (-) <sup>c</sup>
	Canada	U. S.			
	% p. a.	% p. a.	% p. a.	% p. a.	% p. a.
1960					
January	4.60	4.12	- .48	- .53	- .05
February	4.61	4.17	- .44	- .46	- .02
March	3.01	2.79	- .22	- .46	- .24
April	3.26	3.32	+ .06	- .04	- .10
May	3.01	3.50	+ .49	+ .12	- .37
June	3.07	2.40	- .67	+ .24	+ .91
July	2.92	2.40	- .52	- .20	+ .32
August	2.01	2.55	+ .54	- .04	- .58
September	1.70	2.29	+ .59	+ .35	- .24
October	3.03	2.13	- .90	+ .20	+1.10
November	3.95	2.33	-1.62	- .35	+1.27
December	3.25	2.15	-1.10	- .71	+ .39
1961					
January	3.04	2.23	- .81	- .40	+ .41
February	3.11	2.50	- .61	- .20	+ .41
March	3.21	2.39	- .82	- .04	+ .78
April	3.28	2.19	-1.09	- .28	+ .71
May	3.14	2.44	- .70	- .55	+ .15
June	2.57	2.22	- .35	- .28	+ .07
July	2.55	2.24	- .31	- .17	+ .14
August	2.26	2.32	+ .06	- .04	- .10
September	2.59	2.23	- .36	+ .08	+ .44
October	2.50	2.33	- .17	+ .12	+ .29
November	2.50	2.61	+ .11	+ .33	+ .22
December	2.99	2.59	- .40	+ .17	+ .57
1962					
January	3.07	2.71	- .36	- .17	+ .19
February	3.21	2.66	- .55	- .21	+ .34
March	3.12	2.72	- .40	---	+ .40
April	3.07	2.74	- .33	- .08	+ .25
May	3.52	2.66	- .86	- .26	+ .60
June	5.45	2.79	-2.66	-1.09	+1.57
July	5.47	2.89	-2.58	-2.03	+ .55
August	4.95	2.81	-2.14	-1.98	+ .16
September	4.99	2.75	-2.24	-1.81	+ .43
October	4.16	2.69	-1.47	-1.55	- .08
November	3.71	2.85	- .86	- .82	+ .04
December	3.91	2.89	-1.02	- .60	+ .42





TABLE 2-- Continued

Year and Month	3 Month Treasury Bill Rate		Interest Parity Value Premium (+) or Discount (-)	Actual Forward Premium (+) or Discount (-)	Intrinsic Premium (+) or Discount (-)
	Canada	U. S.			
	% p. a.	% p. a.	% p. a.	% p. a.	% p. a.
1963					
January	3.65	2.92	- .73	- .73	---
February	3.68	2.87	- .81	- .78	+ .03
March	3.62	2.92	- .70	- .69	+ .01
April	3.66	2.88	- .78	- .47	+ .31
May	3.19	2.97	- .22	- .13	+ .09
June	3.24	2.98	- .26	+ .04	+ .30
July	3.43	3.26	- .17	---	+ .17
August	3.71	3.40	- .31	- .22	+ .09
September	3.56	3.38	- .18	- .13	+ .05
October	3.59	3.45	- .14	+ .04	+ .19
November	3.63	3.48	- .15	---	+ .15
December	3.78	3.52	- .26	---	+ .26
1964					
January	3.77	3.50	- .27	---	+ .27
February	3.88	3.55	- .33	- .04	+ .29
March	3.88	3.55	- .33	---	+ .33
April	3.70	3.45	- .25	+ .04	+ .29
May	3.58	3.48	- .10	+ .09	+ .19
June	3.59	3.48	- .11	+ .22	+ .33
July	3.67	3.48	- .19	+ .22	+ .41
August	3.80	3.51	- .29	- .22	+ .07
September	3.73	3.56	- .17	- .26	- .09
October	3.70	3.57	- .13	- .17	- .04
November	3.73	3.62	- .11	- .21	- .10
December	3.85	3.86	+ .01	- .13	- .14

<sup>a</sup> Canadian 3 month treasury bill rates are averages of weighted average tender rates on all Thursdays in the month; while U. S. 3 month treasury bill rates are averages of weighted average tender rates on all Mondays in the month.

<sup>b</sup> The interest parity value of the forward Canadian dollar is calculated by subtracting the Canadian 3 month treasury bill rate from the U. S. 3 month treasury bill rate.

<sup>c</sup> The intrinsic premium (or discount) is calculated by subtracting the interest parity value from the actual forward premium (or discount).

Sources:

Bank of Canada, Statistical Summary (Ottawa: Bank of Canada, monthly). Table 1, p. 60.



A. The Behaviour of the Spot Canadian Dollar 1959-1964

During the period covered by this study the spot Canadian dollar underwent considerable variation--both in its value and its method of determination. For approximately half of the five year period (from January 1960 to May 1962) Canada operated under a flexible exchange rate system in which the external value of the Canadian dollar was determined by market forces with very little, if any, intervention on behalf of the Canadian foreign exchange authorities. During the latter half of the period from May 1962 on, a pegged exchange rate system was in operation with the Canadian authorities pegging the Canadian dollar at \$0.925 U.S. Throughout the period from May, 1962 to December, 1964, therefore, the Canadian dollar was maintained, in accordance with the International Monetary Fund regulations, within 1% of the "par" value of 92-1/2 cents U.S.<sup>1</sup>

As can be seen from Chart 1, the spot value of the Canadian dollar fell almost continuously from its peak of \$1.052 U.S. in March, 1960 until it was pegged at \$0.925 U.S. in May 1962. This decline in the spot exchange rate was partly due to market forces and partly due to official policy decisions on the part of the Canadian government. During the late 1950's the Canadian dollar had risen to a considerable premium with respect to the U.S. dollar due to very large capital flows from the U.S. into Canada. In 1960 it became generally felt in Canada that the high exchange rate on the Canadian dollar had been at least partly responsible for the depressed economic conditions during the late 1950's

---

<sup>1</sup>This gives an upper limit of 93.425 cents U.S. and a lower limit of 91.575 cents U.S. to the spot Canadian dollar.





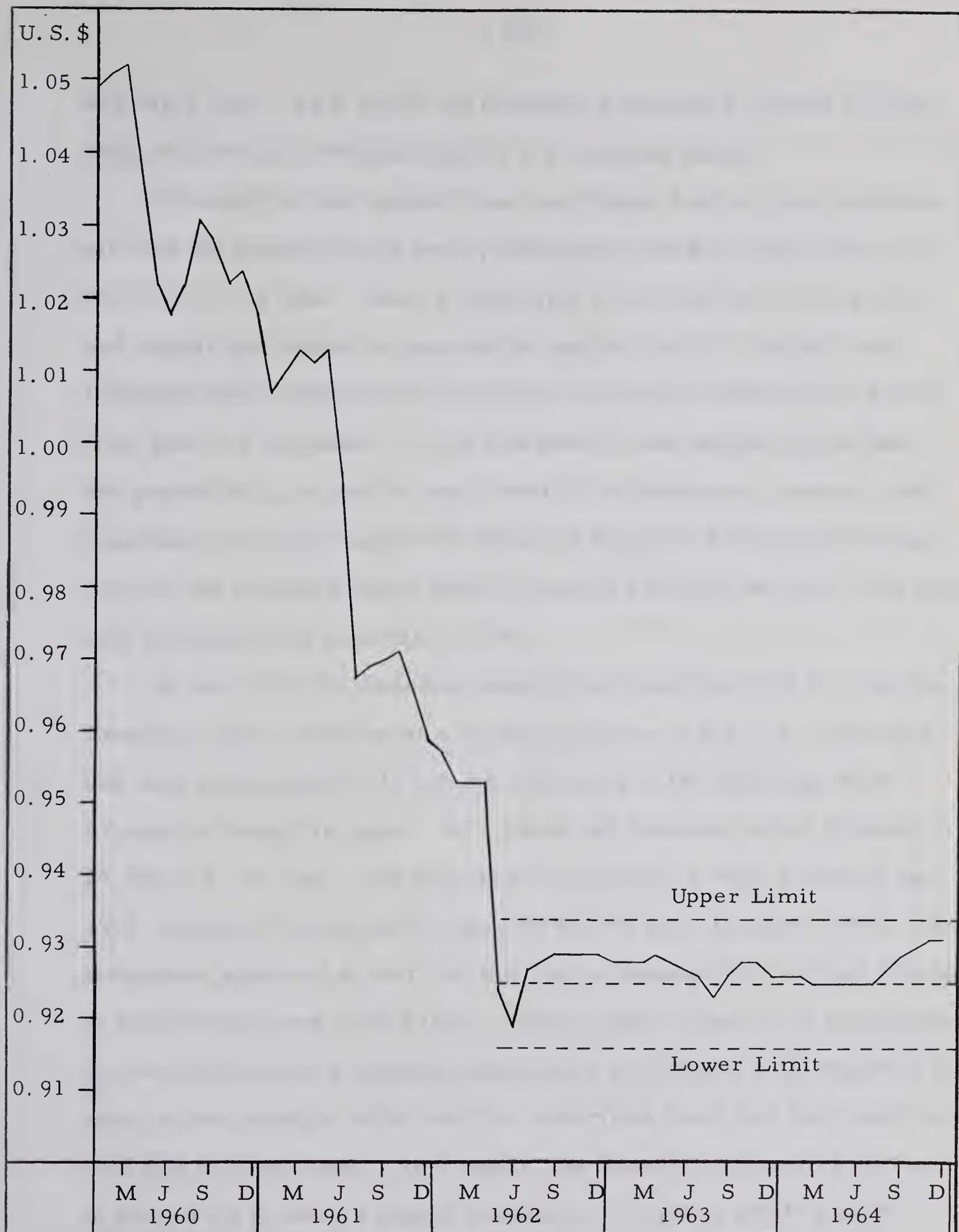


CHART 1. -- THE SPOT CANADIAN DOLLAR 1959-1964



and early 1960. As a result the Canadian government decided to take steps to lower the external value of the Canadian dollar.

By mid-1960 the capital flows into Canada had declined substantially and the market forces were pushing the Canadian dollar lower--to \$1.018 U.S. by June. After a slight rise in the spot rate during July and August (due mainly to speculation against the U.S. dollar), the Canadian dollar continued its downward movement--declining to \$1.018 U.S. again by December. Up to this point it was market forces that had pushed the spot rate to lower levels. In December, however, the Canadian government explicitly stated its desire to lower the external value of the Canadian dollar and this caused a further decline in the spot rate throughout the first half of 1961.

In June 1961 the Canadian authorities stated that they felt that the Canadian dollar should be at a discount relative to the U.S. dollar and that they were prepared to use the resources of the Exchange Fund Account to bring this about. As a result the Canadian dollar dropped to \$0.994 U.S. in June, 1961 and, with exception of a short period in late 1961, continued to fall until it reached \$0.953 U.S. in April, 1962. The authorities appeared to feel that this was an appropriate rate and attempted to hold the spot rate at this level. By this time, however, a combination of circumstances had created considerable uncertainty with regard to the value of the Canadian dollar and the authorities found that they could not hold this exchange rate. As a result, the Canadian authorities decided in May, 1962 to adopt a pegged exchange rate system and to peg the Canadian dollar at \$0.925 U.S.

Since May, 1962, therefore, the spot Canadian dollar has been maintained within 1% of the official pegged rate by the foreign exchange





authorities. During this period, with the exception of a sharp drop in June, 1962, the spot Canadian dollar has been relatively stable with only minor variations about the \$0.925 U.S. level. In July and August of 1963, however, the spot rate did show some weakness as a result of the proposed U.S. Interest-Equalization legislation which, it was feared, would substantially reduce the capital flows from the U.S. to Canada. In late 1963 the spot rate recovered (due to a special exemption from the U.S. Interest-Equalization proposal and a substantial surplus on commodity trade resulting from large wheat sales to the U.S.S.R.) and remained very stable until mid-1964. In late 1964 when the terms of the U.S. Interest-Equalization legislation were finalized and the large capital flows from the U.S. resumed, the Canadian dollar rose towards the upper limit--closing at \$0.931 U.S. in December, 1964.

B. The Premium or Discount on the Forward Canadian Dollar 1959-1964

The forward Canadian dollar, as can be seen from Chart 2, has been at either a premium or a discount of less than 1% throughout the five year period, with the exception of the period immediately surrounding the foreign exchange crisis of mid-1962. Throughout 1960 and 1961 the forward rate varied from a premium of 0.5% to a discount of 0.5% with only slight movements beyond this range. From June until August, 1962, however, the forward discount widened beyond the 1% level and reached a maximum of 2% during July of that year. This discount gradually narrowed during late 1962 and early 1963 and since then the forward rate has moved within a very narrow range and has deviated only slightly from the spot rate.

C. The U.S. -Canadian Interest Rate Differential 1959-1964

The U.S. -Canadian short-term interest rate differential is





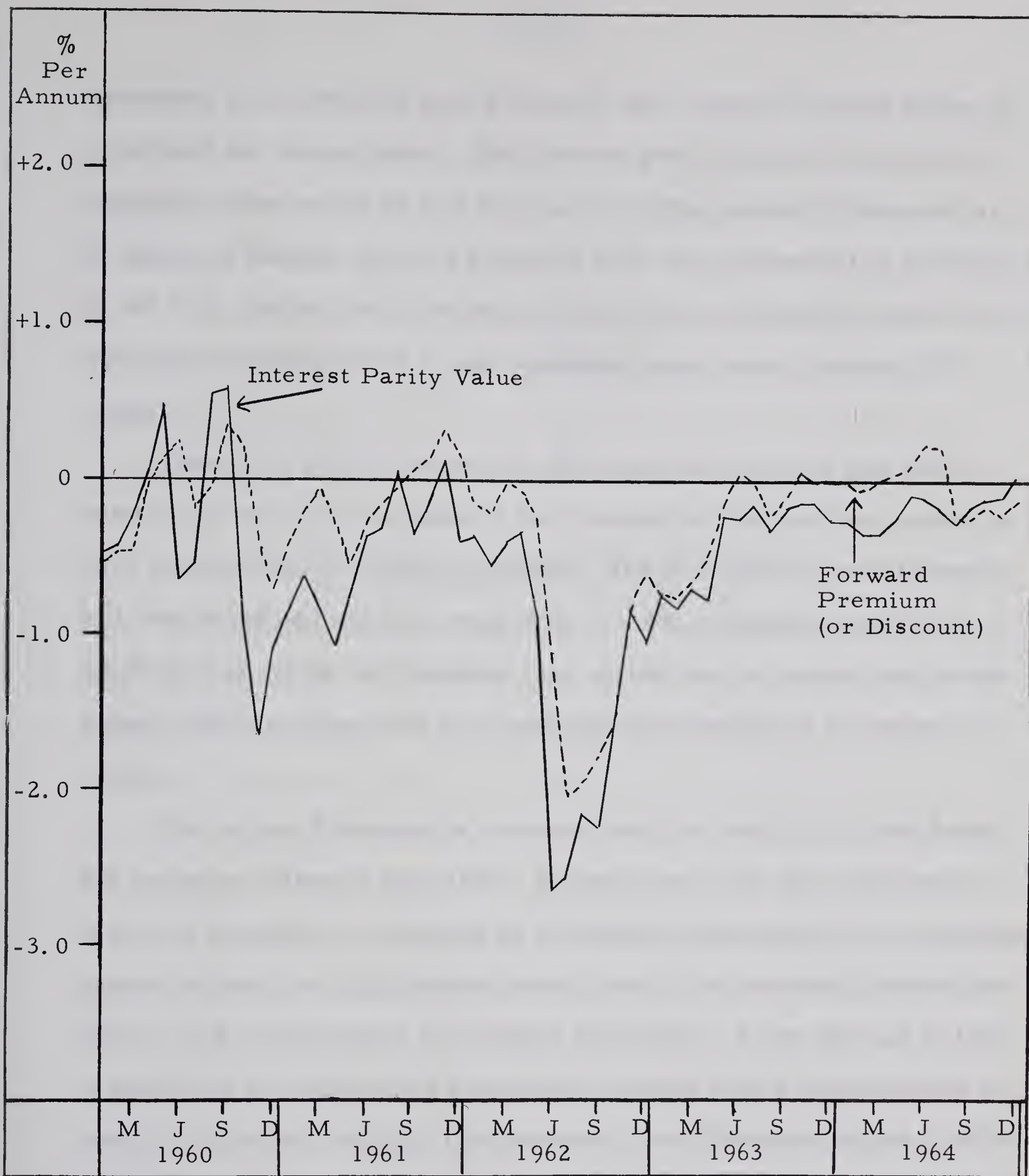


CHART 2. -- THE INTEREST PARITY VALUE OF THE FORWARD CANADIAN DOLLAR AND THE FORWARD PREMIUM (OR DISCOUNT) ON THE FORWARD CANADIAN DOLLAR 1959-1964



equivalent to the interest parity value of the forward Canadian dollar on a per cent per annum basis. The interest parity value of the forward Canadian dollar would be at a discount when the interest differential is in favour of Canada; and at a premium when the differential is in favour of the U.S. In this study the short-term interest differential will be the difference between the U.S. and Canadian three month treasury bill rates.

During the period covered by this study the interest rate differential was, with the exception of four months in 1960 and two months in 1961 continuously in favour of Canada. The U.S. three month treasury bill rate remained within a range from 2 - 4% throughout almost the whole period, while the Canadian rate varied over a considerably wider range--thereby giving rise to substantial differentials in a number of cases.

The widest differentials occurred near the end of 1960 and during the exchange crises in mid-1962. In November 1960, the differential in favour of Canada (i.e. discount on the forward Canadian dollar at interest parity) widened to 1.62% after a sharp rise in the Canadian interest rate from 1.70% in September to 3.95% in November. From the end of 1960 to mid-1962 the differential remained relatively stable and generally in favour of Canada. In May, 1962 however, the differential began to widen and reached a maximum of 2.66% in favour of Canada during June when the Canadian interest rate rose to 5.45%. The differential slowly declined after this but remained at a substantial level in favour of Canada until April of 1963.

From mid-1963 on, the U.S. and Canadian interest rates have differed very little, partly because of Canada's strong foreign trade position during this period and partly because of the limitations placed





on Canada with regard to the accumulation of foreign exchange reserves by the special Canadian exemption from the U. S. Interest-Equalization legislation. Under the terms of this exemption the Canadian authorities have pledged not to expand their holdings of U. S. dollar reserves beyond the level that existed before the legislation was proposed. As a result, the short-term interest differential between the U. S. and Canada must be maintained within a very narrow range in order to avoid attracting any unwanted short-term capital flows from the U. S. to Canada.

D. The Intrinsic Premium or Discount on the  
Forward Canadian Dollar 1959-1964

The intrinsic premium or discount on the forward Canadian dollar has remained within a range from a premium of 0.5% to a discount of 0.5% for the majority of the period under review. The forward Canadian dollar did, however, move to an intrinsic premium of greater than 0.5% five times and to an intrinsic discount of greater than 0.5% once during the five year period--as indicated by the shaded areas in Chart 3.

In 1960 the forward Canadian dollar rose to an intrinsic premium of 0.91% in June, fell to an intrinsic discount of 0.58% in August, and rose again to an intrinsic premium of 1.27% in November. After falling in early 1961, the intrinsic premium rose to 0.78% in March from which it fell until December when it rose to 0.57%. The largest intrinsic premium to arise was during the mid-1962 period, when a maximum of 1.57% was reached in June. Since July, 1962, however, there has not been an intrinsic premium or discount greater than 0.5%. This has been at least partly due to substantial intervention by the Canadian foreign exchange authorities in the market for forward Canadian dollars which will be discussed more fully in the next chapter of this study.



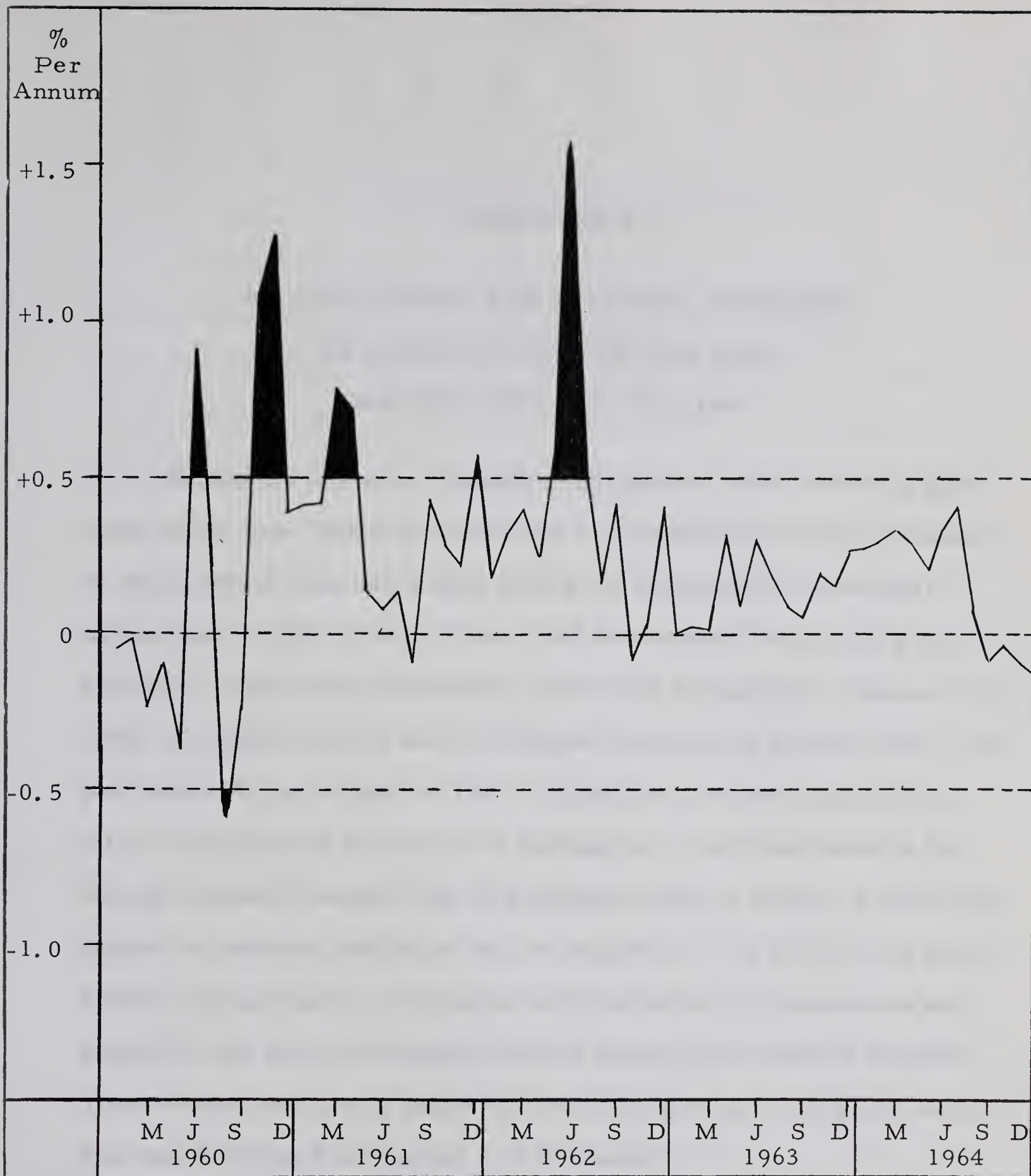


CHART 3. -- THE INTRINSIC PREMIUM (OR DISCOUNT)  
ON THE FORWARD CANADIAN DOLLAR 1959-1964





## CHAPTER 4

### AN ANALYSIS OF THE INTRINSIC PREMIUMS

### OR DISCOUNTS ON THE FORWARD

### CANADIAN DOLLAR 1959-1964

During the period of Canadian experience under review in this study there were intrinsic premiums of greater than 0.5% per annum on the forward Canadian dollar during the following five intervals: during June, 1960; during October and November, 1960; during April and May, 1961; during December, 1961; and during May, June and July, 1962. In addition there was an intrinsic discount of greater than 0.5% per annum during August of 1960. In section A of this chapter the intrinsic premiums or discounts that appear to indicate doubt in the foreign exchange market will be analyzed; while in section B those that appear to indicate confidence will be analyzed. The predictions given by this analysis will be compared with the actual circumstances that existed in the foreign exchange market during each interval analyzed. These comparisons will constitute the basic test of the Reading Model that was developed in Chapter 2 of this study.

In section C of this chapter the possible effects of official intervention in the market for forward Canadian dollar will be analyzed and the significance of this intervention with regard to the validity of the model in the Canadian case will be discussed. The general difficulties and weaknesses of the model will then be discussed in the last section





of the chapter.

A. The Presence of "Doubt" Intrinsic  
Premiums or Discounts

A "doubt" intrinsic premium, as shown in Chapter 2, is one that is associated with a rise in the spot exchange rate; while a "doubt" intrinsic discount is associated with a spot-rate fall. As a result, under conditions of doubt in the foreign exchange market, an intrinsic premium will disappear with a fall in the spot rate and an intrinsic discount with a rise. During the five year period covered by this study there appeared to be three intrinsic premiums (of greater than 0.5%) on the forward Canadian dollar that followed this pattern of behaviour and, hence indicated a state of non-confidence in the foreign exchange market. The presence of a state of doubt would imply that speculation was of a destabilizing nature during those intervals.

The first "doubt" intrinsic premium arose during October and November of 1960. In October the Canadian three month treasury bill rate rose sharply (while the U.S. rate declined slightly) and the interest-parity discount on the forward Canadian dollar widened to 0.9%. In November the Canadian treasury bill rate again increased, thereby widening the interest-parity discount still further. The forward rate on the Canadian dollar, however, failed to fall sufficiently to meet this wider interest-parity discount (and, in fact, was even at a premium during October) thereby causing an intrinsic premium of 1.10% in October and 1.27% in November. It was not until the spot rate fell in December that the intrinsic premium returned to a more normal level. As a result, the behaviour of the intrinsic premium on the forward Canadian dollar during this period indicated a state of doubt in the foreign exchange market with speculators anticipating a fall in the spot rate.



The second intrinsic premium that appeared to behave as a "doubt" premium occurred during March and April of 1961. An intrinsic premium of 0.78% appeared in March and remained at almost the same level during April. This situation resulted from the combination of a rise in the Canadian three month treasury bill rate and a fall in the U.S. rate. The intrinsic premium fell during May, declined even further in June, and finally changed to an intrinsic discount by August. The rapid decline of the intrinsic premium was accompanied by a sharp drop in the spot rate in June and July--during which the Canadian dollar actually moved to a discount with respect to the U.S. dollar. It would appear, therefore, that the behaviour of this intrinsic premium also indicated non-confidence in the foreign exchange market--in anticipation of a further fall in the spot rate.

An intrinsic premium of greater than 0.5% also arose in December of 1961 and behaved as a rather weak indicator of doubt in the foreign exchange market. It developed when the interest parity moved from a premium in November to a discount in December as the result of a substantial increase in the Canadian interest rate. The forward rate, however, failed to move with this change in the interest parity and an intrinsic premium of 0.57% developed. This premium disappeared when the spot rate continued to fall in the early months of 1962 and, therefore, behaved as a "doubt" intrinsic premium.

Throughout the whole period covered by these "doubt" intrinsic premiums there actually appeared to be a considerable degree of uncertainty surrounding the external value of the Canadian dollar with the general expectation being that the spot rate would move to lower levels. This uncertainty appeared to stem from the lack of a clear and





explicit foreign exchange policy on the part of the Canadian government. Although Canada was theoretically operating under a flexible exchange rate system throughout this whole period, the Canadian authorities were exerting a considerable influence on the spot rate both through indirect policy measures that affected capital flows and through direct use of the official foreign exchange reserves.

This uncertain government policy appeared to give rise to waves of uncertainty in the foreign exchange market. In late 1960, when a change in the attitude of the Canadian government towards the external value of the Canadian dollar was anticipated, there developed a period of considerable uncertainty in the foreign exchange market especially with regard to the possibility of official intervention in the spot market. In December 1960 the government explicitly stated its desire for a lower exchange rate and attempted to employ policies that would reduce the capital inflow to bring this about. Throughout early 1961, however, the Canadian authorities began to interfere in the spot market and a further change in government policy began to be anticipated in March and April of 1961. In addition the "Coyne affair" was approaching its climax and considerable uncertainty with regard to government policy was generated by this incident.

In June 1961 the government, in the Budget speech, made the first explicit statement regarding its foreign exchange policy. The authorities stated that they felt that the Canadian dollar should be brought to a "substantial" discount with respect to the U.S. dollar and that they favored official intervention to bring this about. This, however, if anything increased the uncertainty surrounding the Canadian dollar and as Shepherd points out:



There was in this period a great deal of unsettlement and uncertainty, based on the declared intention to put and keep the Canadian dollar at a 'substantial' discount. No clear-cut indication was given as to what was considered 'substantial'; possibly the Government itself was feeling its way carefully. . . .<sup>1</sup>

As a result of this high degree of uncertainty it would appear that speculative activities with regard to the Canadian dollar would be of a destabilizing nature. This type of speculation under a flexible exchange rate system would tend to push the spot rate downward if the speculation tended to be in a downward direction. The Canadian experience during this period would appear to support this view and it would appear that speculative activity at least supported the other factors making for a lower external value for the Canadian dollar. This also confirms the predictions of the model used in this study.

#### B. The Presence of "Confidence" Intrinsic Premiums or Discounts

The model employed in this study defines an intrinsic premium that rises with a fall in the spot rate and falls with a spot-rate rise as a "confidence" intrinsic premium; while an intrinsic discount that is associated with a spot-rate rise and disappears with a fall in the spot rate is a "confidence" intrinsic discount. During the period under review in this study there were two intrinsic premiums and one intrinsic discount that appeared to behave in this manner.

The first of the "confidence" intrinsic premiums arose during June of 1960 when the intrinsic premium rose to 0.91% per annum. This intrinsic premium was associated with a sharp fall in the U.S. three month treasury bill rate and with a fall in the Canadian dollar spot rate

---

<sup>1</sup>Sidney A. Shepherd, Foreign Exchange in Canada: An Outline (Supp. to 3rd ed.; Toronto: University of Toronto Press, 1963), p. 16.





during April and May. The Canadian dollar had reached its peak in the spot market during March of 1960 and then fell steadily until July and August when it again showed considerable strength. When the spot rate rose during July the intrinsic premium fell and turned to a substantial intrinsic discount in August. As a result, the intrinsic premium that developed during June of 1960 behaved as a "Confidence" intrinsic premium and acted as an indicator of confidence in the foreign exchange market.

In August of 1960 an intrinsic discount of greater than 0.5% developed. This development was in conjunction with a fall in the Canadian three month treasury bill rate and a rise in the Canadian dollar spot rate. In September, however, when the spot rate resumed its steady decline the intrinsic discount tended to disappear; thus indicating confidence in the foreign exchange market during this period.

During the mid-1960 period covered by these confidence indicators, there did, in actual fact, appear to be a considerable degree of confidence in the Canadian dollar. Although it had undergone a steady decline since March of 1960 the Canadian dollar still looked as if it would remain at a substantial premium with respect to the U.S. dollar. The main cause of the weakness in the Canadian dollar appeared to be a temporary decline in the capital flows from the U.S. into Canada. It seemed to be generally felt that these capital flows, in the absence of any government policy directed against them, would again return to more "normal" levels and push the Canadian dollar back toward its original high level. It was not until late 1960, when there appeared to be a shift in the foreign exchange policy of the Canadian government, that this confidence in the Canadian dollar was shaken. As a result it would appear that the indicator correctly reflected the state of confidence in the foreign exchange





market during this period.

The next period in which a "confidence" intrinsic premium appeared to arise was during the period from May to July of 1962. As the Canadian three month treasury bill rate rose and the spot rate fell in May 1962 an intrinsic premium of 0.60% developed. This intrinsic premium widened to 1.57% in June as the Canadian interest rate rose further and the spot rate continued to fall (towards its lower limit under the fixed exchange rate system adopted in May). As the spot rate firmed in July, the intrinsic premium declined and it continued to decline as the spot rate rose steadily during the latter half of 1962. As a result, the intrinsic premium behaved as an indicator of confidence throughout the entire period immediately surrounding the 1962 "exchange crisis."

The actual circumstances that existed during this mid-1962 period would appear to somewhat contradict the prediction of confidence made by the model during the months of May and June. The period immediately preceding and following the May 1962 devaluation of the Canadian dollar appeared to be one in which confidence in the Canadian dollar reached its lowest ebb, with the foreign exchange reserves suffering large losses both before and after the establishment of the fixed rate. As Binhammer has pointed out, this situation did not appear to change immediately after the pegging of the Canadian exchange rate.

Devaluating and pegging the dollar halted the massive reduction in official reserves only briefly. The change in policy, with no appearance of being permanent, came too late to provide the necessary long-run stability in the foreign exchange market. In June the indecisive result of the federal election and further contradictory statements by members of the Conservative minority government concerning the future of the Canadian dollar added to the loss of confidence in Canadian affairs and policy.<sup>2</sup>

---

<sup>2</sup>H. H. Binhammer, "Canada's Foreign Exchange Problems," Kyklos, Vol. XVII (1964), p. 649.



It would appear, therefore, that the model incorrectly predicted confidence in the foreign exchange market during May and June of 1962. This incorrect prediction probably resulted from the fact that the Canadian authorities were intervening heavily in the market for forward Canadian dollars during this period. This possibility will be discussed more fully in the next section of this chapter.

In late June the Canadian government announced that it was determined to defend the Canadian dollar at the U.S. \$0.925 level, that special austerity measures were to be taken to reduce the government deficit, and that large international support had been mobilized to defend the Canadian dollar. These measures, combined with the large increase in the Bank rate to 6%, appeared to restore confidence in the Canadian dollar and the spot rate began to rise steadily, as did the foreign exchange reserves. It would appear, therefore, that the model correctly predicted confidence during late June and July of 1962 and this confidence appeared to continue during the remainder of 1962 and into 1963.

From mid-1962 until the end of 1964 there were no substantial (i.e., greater than 0.5%) intrinsic premiums or discounts on the forward Canadian dollar. As a result, the model has very little to say about the level of confidence in the foreign exchange market during this period. If, however, the fact that substantial official intervention occurred in the forward exchange market during certain intervals is taken into consideration in conjunction with the movements of the intrinsic premium or discount, it may be possible to determine intervals in which there was considerable doubt or confidence in the Canadian dollar. This will be explored more fully in the following section.







C. The Possible Role of Official Intervention in the  
Market for Forward Canadian Dollars

During the five year period under review the model failed in some cases (notably during 1963 and 1964) to give a decisive indication of either doubt or confidence in the foreign exchange market. In another case (during May and June of 1962) it appeared to give a false indication of confidence. The possibility that these indecisive and misleading results could have been caused by official intervention in the market for forward Canadian dollars will now be analyzed.

Although the data presented in Table 3 with regard to the monthly forward exchange transactions entered into by Canadian Exchange Fund Account are rather crude (since overnight transactions are also included and the term of the forward transactions is not known), they can indicate the direction and approximate volume of official intervention in the forward exchange market. During the period covered by the flexible exchange rate system it would appear that very few, if any, forward transactions were entered into by the Exchange Fund Account, and it was not until the adoption of the fixed rate that the authorities began to intervene in the forward market.

The first intervention of any size appeared to occur in April of 1962 when the Canadian authorities sold U.S. dollars forward (i.e. purchased Canadian dollars forward) in order to support the rate on the forward Canadian dollar and prevent any outward arbitrage flows. This intervention reached its peak in June of 1962 and the authorities gradually reduced their position in the forward market until it virtually disappeared in September. In October, 1962 the authorities appeared to enter the market temporarily in the opposite direction as a stabilizing measure.

It would appear that this intervention on behalf of the Canadian



TABLE 3

EXCHANGE FUND ACCOUNT MONTHLY FORWARD EXCHANGE  
TRANSACTIONS AND BALANCE OF FORWARD EXCHANGE  
TRANSACTIONS OUTSTANDING 1959-1964<sup>a</sup>

Year and Month	Forward Sales (-) or Purchases (+) of U.S. Dollars	Forward U.S. Dollar Transactions Outstanding <sup>b</sup>	Year and Month	Forward Sales (-) or Purchases (+) of U.S. Dollars	Forward U.S. Dollar Transactions Outstanding
Millions of U. S. \$			Millions of U. S. \$		
1960			1962		
January	+ 0.4	- 0.4	July	+ 41.4	-213.9
February	+ 1.9	+ 1.5	August	+ 99.3	-114.6
March	- 12.0	- 10.5	September	+102.8	- 11.8
April	+ 6.6	- 3.9	October	+115.4	+103.6
May	+ 2.8	- 1.1	November	-103.6	-----
June	+ 1.1	-----	December	-----	-----
July	- 2.1	-----	1963		
August	- 1.7	- 3.8	January	- 2.3	- 2.3
September	+ 4.8	+ 1.0	February	+ 2.3	-----
October	+ 1.0	+ 2.0	March	-----	-----
November	- 2.0	-----	April	+ 48.5	+ 48.5
December	+ 0.5	+ 0.5	May	- 18.0	+ 30.5
1961			June	- 12.5	+ 18.0
January	- 0.5	-----	July	- 17.0	+ 1.0
February	+ 0.1	+ 0.1	August	- 5.0	- 4.0
March	- 0.1	-----	September	+108.6	+104.6
April	-----	-----	October	- 26.2	+ 78.4
May	+ 1.7	+ 1.7	November	- 1.5	+ 76.9
June	- 13.4	- 11.7	December	- 22.9	+ 54.0
July	+ 11.7	-----	1964		
August	-----	-----	January	+ 9.4	+ 63.4
September	-----	-----	February	- 24.9	+ 38.5
October	- 7.7	- 7.7	March	+ 66.0	+104.5
November	- 1.0	- 8.7	April <sup>c</sup>	- 62.8	+ 41.7
December	- 1.3	- 10.0	May	- 6.5	+ 35.2
1962			June	- 17.7	+ 17.5
January	- 1.4	- 11.4	July	- 16.8	+ 0.7
February	+ 10.4	- 1.0	August	- 0.7	-----
March	- 3.5	- 4.5	September	+ 43.0	+ 43.0
April	- 46.4	- 50.9	October	+ 25.5	+ 68.5
May	- 52.5	-103.4	November	- 7.0	+ 61.5
June	-151.9	-255.3	December	- 1.5	+ 60.0





<sup>a</sup>These transactions include overnight transactions with the Bank of Canada in addition to forward and overnight transactions with all others. The term of the forward commitments may vary from a term of a few days to a few months.

<sup>b</sup>A plus sign (+) indicates a net commitment to take delivery of U.S. dollars in the future (i.e., deliver Canadian dollars in the future) and a negative sign (-) indicates a net commitment to deliver U.S. dollars in the future (i.e., take delivery of Canadian dollars in the future).

<sup>c</sup>From April to December 1964 forward transactions with the Bank of Canada are also included. These transactions were related to the assistance provided to the United Kingdom in support of sterling during this period.

Sources:

Bank of Canada, Statistical Summary, 1963 Supplement (Ottawa: Bank of Canada, 1963).

Department of Finance, Annual Report of the Minister of Finance to Parliament on the Operations of the Exchange Fund Account (Ottawa: Department of Finance, 1964).

authorities was probably the major reason for the failure of the model to indicate doubt in the Canadian dollar during May and June of 1962 when actual circumstances appeared to indicate the existence of a state of non-confidence in the foreign exchange market. The official intervention during this period enabled the intrinsic premium on the forward Canadian dollar to rise while the spot rate continued to fall and thereby act as a "confidence" intrinsic premium. Without this intervention an intrinsic discount could possibly have arisen as the spot rate fell, which would have indicated doubt in the Canadian dollar. The fact that the volume of official intervention increased substantially (by approximately U.S. \$100 million) between May and June would also appear to confirm that non-confidence actually existed in the foreign exchange market during this two month period.

The next substantial official intervention in the forward market





appeared to take place in April of 1963 with the Canadian authorities buying U. S. dollars forward (selling Canadian dollars forward) in order to reduce the intrinsic premium on the forward Canadian dollar. This intervention coincided with a tendency for the intrinsic premium to rise as the spot rate rose--which would appear to indicate doubt in the foreign exchange market. In this case the doubt appeared to arise from the possibility that the Canadian authorities would have to appreciate the Canadian dollar to a more appropriate level in the light of buoyant export trade and continued large capital inflows. This situation was reversed, however, in June, when uncertainty developed about the measures taken in the Canadian budget to discourage capital inflows; and in July, when the U. S. Interest-Equalization proposal was brought forward by the U. S. government.

In September 1963 the Canadian authorities again bought U. S. dollars forward (sold Canadian dollars forward) in substantial amounts. This again corresponded to a period in which the Canadian spot rate was rising strongly (after a short decline in mid-1963). The fact that the intrinsic premium on the forward Canadian dollar remained unchanged during this period was probably due to the substantial forward intervention. As a result, the intrinsic premium was prevented from giving any prediction with regard to the state of confidence in the foreign exchange market. This again was probably a situation in which there was doubt as to whether the Canadian authorities could maintain the Canadian dollar below its upper limit in the wake of the special Canadian exemption from the U. S. Interest-Equalization legislation and the large wheat sale to the Soviet Union.

The Canadian authorities appeared to maintain a substantial



position in the forward market during the remainder of 1963 and into the early part of 1964. In addition they intervened strongly again in March of 1964 in order to prevent the intrinsic premium on the Canadian dollar from rising and thus inducing short-term capital flows into Canada. This occurred during a period when the Canadian dollar was somewhat weaker and the intrinsic premium appeared to rise as the spot rate fell. As a result, the behaviour of the intrinsic premium could be interpreted as a weak indicator of confidence in the Canadian dollar par value of U.S. \$0.925. In September 1964 the Canadian authorities again intervened--mainly in connection with the assistance given to the United Kingdom in support of the pound sterling. Previous to this intervention the intrinsic premium had again been rising and the sale of Canadian dollars forward on behalf of the authorities reduced it substantially (in fact to an intrinsic discount). As a result, the prediction of the model is again clouded by the official intervention in the market. In the actual situation there appeared to be considerable confidence in the Canadian dollar after the U.S. Interest-Equalization legislation was finally passed by the U.S. Congress.

As a result of the above analysis it would appear that the failure of the model to provide any precise indication of the state of confidence in the foreign exchange market during 1963 and 1964 was mainly due to official intervention in the forward market for Canadian dollars. During the last half of 1963 and all of 1964 this intervention became almost a necessity if Canada was to comply with the regulations of the special Canadian exemption from the U.S. Interest-Equalization legislation without altering the interest rate structure appropriate to the needs of the domestic economy. If any tendency for the intrinsic premium or discount to move developed, the Canadian authorities had to intervene in the forward market and either







prevent the forward rate from moving or move it in the opposite direction. The model developed in this study, therefore, has been severely restricted in its usefulness during this period of Canadian experience.

#### D. An Assessment of the Model

From the analysis of the Canadian experience during the five year period 1959-1964 it can be seen that the Reading model, as developed in Chapter 2, can operate reasonably well as long as the forward exchange market is allowed to operate freely without any intervention on behalf of the foreign exchange authorities. If official intervention does occur the usefulness of the Reading model as an indicator of confidence or non-confidence in the foreign exchange market is substantially reduced.

During the period of Canadian experience covered by the flexible exchange rate system, when there was little, or no official intervention in the forward market, the behaviour of the intrinsic premium or discount appeared to indicate correctly, confidence or doubt in the foreign exchange market. After the fixed exchange rate was adopted and the authorities began to intervene in the forward market, however, confidence or doubt could only be predicted if the movement of the intrinsic premium or discount were taken in conjunction with the volume of official intervention in the forward market. This combination, although not a precise indicator, did allow us to say something about the degree of confidence in the foreign exchange market during the intervals when official intervention was substantial.

Another factor which reduces the usefulness of the model is the fact that it is not able to distinguish between the effects of changes in the interest rate differential and the effects of changes in the spot exchange rate on the behaviour of the intrinsic premium or discount. Since changes



in both the interest parity and the spot rate can affect the intrinsic premium or discount it is often difficult to determine which has the predominant effect in any given case if both are changing at the same time.

Official intervention in the spot market could also create some difficulties for the model but these are likely to be relatively unimportant as long as the authorities allow the spot rate to move and do not intervene until either the upper or lower limit is approached and as long as the forward rate is allowed to move freely. If the authorities attempt to hold the spot rate within a very narrow range, then the volume of official intervention in the spot market would have to be employed along with the behaviour of the intrinsic premium or discount to determine whether confidence or non-confidence existed in the foreign exchange market.

The problems involved in using the Reading model arise from the nature of the partial equilibrium analysis employed in the development of the model. This type of analysis can only analyze the relationship between two variables (in this case the relationship between movement of the spot exchange rate and the behaviour of the intrinsic premium or discount) and must assume all other variables (interest rates, government policy, etc.) to be constant. This is a difficulty in most economic models and is not an exclusive problem of the Reading model employed in this study. However, if two or more independent variables in the system (for example, the interest rate differential and the spot exchange rate) are changing at the same time, additional information from outside the model must be employed to interpret the results given by the partial equilibrium analysis. This, of course, reduces the precision of the model and increases the problems of interpreting the results given by the analysis.

The Reading model, however, in most cases does provide a useful,





although crude, indication of the degree of confidence or non-confidence in the foreign exchange market. It is an attempt to provide a general indicator of confidence that can be readily applied and tested empirically in any given situation. In the pursuit of this goal it has been relatively successful, but it must be remembered that the results obtained can only be interpreted in the light of additional information not explicitly included in the model.





## CHAPTER 5

### CONCLUSION

As a result of the above analysis, it is obvious that the Reading model, using the behaviour of the intrinsic premium or discount as an indicator of confidence or non-confidence, does not provide a complete solution to the problem of determining the state of expectations in the foreign exchange market. The difficulties of the Reading model arise mainly from the fact that the analysis underlying its development is of a static partial equilibrium nature. As a result, it cannot explicitly take into account all of the variables involved in the determination of the intrinsic premium or discount on the forward currency and cannot analyze the process of adjustment from one equilibrium position to another (that is, the process of adjustment from one intrinsic premium or discount to another after the value of some variable in the system has been altered).

To be useful, therefore, when two or more variables in the system are changing at the same time, the results given by the model must be used along with additional data from outside the model (such as changes in the interest rate differential, changes in official foreign exchange holdings, changes in the volume of official forward market intervention, and so on). The need for this outside data reduces the precision of the model in predicting confidence or non-confidence in the foreign exchange market and, as a result, the model under those conditions is of limited use as a predictive tool. The model is useful, however,



in analyzing past events; that is, to test whether speculation has in fact been of the type suggested by other factors at different times in the past. Its predictive powers, on the other hand, can be substantial only if the model is operating in a true "ceteris paribus" situation (in particular, when interest rates are constant and there is no official intervention in the forward market).

The fact that the Reading model has not proved to be entirely satisfactory does not mean that the forward exchange approach to the problem has to be abandoned altogether. As stated earlier in this study, and as emphasized by Einzig, a general equilibrium process type of analysis is needed to fully explain forward exchange. If a truly dynamic general equilibrium model of forward exchange could be developed in which the effect of changes in all of the variables (or at least the most important) could be considered simultaneously and the process of adjustment could be included in the analysis, the behaviour of the forward exchange rate could possibly give a reasonably accurate picture of the state of expectations in the foreign exchange market. The difficulties involved in developing such a model are immense, particularly with respect to introducing government policy into the analysis; and the model would undoubtedly involve some form of mathematical analysis. These difficulties must be overcome, however, if the effects of forward exchange on the economic system are to be fully explained and understood.

The problem of quantifying expectations is common to much of economic analysis and is not peculiar to the analysis of the foreign exchange market. As a result, many attempts have been made to develop methods of measuring confidence or non-confidence in various situations --none of which have met with any great degree of success. One of these





methods, which could possibly be attempted for the foreign exchange market, would be the development of some independent index of confidence. The task of doing so, however, would again be very difficult.

It would appear, therefore, that the forward exchange market still offers the best approach to the problem of measuring confidence or non-confidence in the foreign exchange market. The Reading model, although oversimplified and not entirely satisfactory, opens the door for more sophisticated approaches to the problem. If a dynamic general equilibrium model of the forward exchange market could be developed and adapted to the approach taken by the Reading analysis, more satisfactory results could possibly be obtained. This approach, however, is beyond the scope of this study and must await further research in the development of general equilibrium process methods of economic analysis.



## BIBLIOGRAPHY

### Books

- Baumol, William J. Economic Dynamics. 2nd ed. New York: The MacMillan Co., 1959.
- Bloomfield, Arthur I. Capital Imports and the American Balance of Payments 1934-39. Chicago: University of Chicago Press, 1950.
- Due, John F. and Clower, Robert W. Intermediate Economic Analysis. 4th ed. Homewood, Illinois: Richard D. Irwin, Inc., 1961.
- Einzig, Paul. The Theory of Forward Exchange. London: MacMillan and Co. Ltd., 1937.
- Einzig, Paul. A Dynamic Theory of Forward Exchange. London: MacMillan and Co., Ltd., 1961.
- Harrod, R. F. Towards a Dynamic Economics. London: MacMillan and Co. Ltd., 1948.
- Hicks, J. R. Value and Capital. 2nd ed. London: Oxford University Press, 1946.
- Keynes, J. M. Monetary Reform. New York: Harcourt, Brace and Co., 1924.
- Keynes, J. M. A Treatise on Money. New York: Harcourt, Brace and Co., 1930.
- Kindleberger, Charles P. International Short-Term Capital Movements. New York: Columbia University Press, 1937.
- Kindleberger, Charles P. International Economics. revised ed. Homewood, Illinois: Richard D. Irwin, Inc., 1958.
- Samuelson, P. A. Foundations of Economic Analysis. Cambridge, Mass.: Harvard University Press, 1963.
- Shepherd, Sidney A. Foreign Exchange in Canada: An Outline. 3rd ed. Toronto: University of Toronto Press, 1961.
- Shepherd, Sidney A. Foreign Exchange in Canada: An Outline. supplement to 3rd ed. Toronto: University of Toronto Press, 1963.





- Sohmen, Egon. Flexible Exchange Rates: Theory and Controversy. Chicago: University of Chicago Press, 1961.
- Vanek, Jaroslav. International Trade: Theory and Economic Policy. Homewood, Illinois: Richard D. Irwin, Inc., 1962.
- Vickery, William S. Microstatics. New York: Harcourt, Brace & World, Inc., 1964.
- Wonnacott, Paul. The Canadian Dollar 1948-1958. Toronto: University of Toronto Press, 1960.

#### Articles

- Auten, J. H. "Counter-Speculation and the Forward Exchange Market," The Journal of Political Economy, Vol. LXIX (February, 1961), pp. 49-55.
- Auten, J. H. "Monetary Policy and the Forward Exchange Market," The Journal of Finance, Vol. XVII (December, 1961), pp. 546-58.
- Auten, J. H. "Forward Exchange Rates and Interest-Rate Differentials," The Journal of Finance, Vol. XVIII (March, 1963), pp. 11-19.
- Binhammer, H. H. "Canada's Foreign Exchange Problems," Kyklos, Vol. XVII (1964), pp. 636-53.
- Einzig, Paul. "Some Theoretico-Technical Aspects of Official Forward Exchange Problems," The Economic Journal, Vol. XLVIII (June, 1938), pp. 249-55.
- Einzig, Paul. "Some Recent Changes in Forward Exchange Practices," The Economic Journal, Vol. LXX (September, 1960), pp. 485-95.
- Einzig, Paul. "Some Recent Developments in Official Forward Exchange Operations," The Economic Journal, Vol. LXXIII (June, 1963), pp. 241-53.
- Grubel, Herbert G. "A Neglected Aspect of Forward Exchange Theory and Policy," The Journal of Finance, Vol. XVIII (September, 1963), pp. 537-48.
- Hansen, Bent. "Interest Policy and Foreign Exchange Policy," Skandinaviska Banken Quarterly Review, (October, 1958), pp. 114-21.
- Hansen, Bent. "Interest Policy, Foreign Exchange Policy and Foreign Exchange Control," Skandinaviska Banken Quarterly Review, (January, 1959), pp. 15-27.
- Jasay, A. E. "Bank Rate and Forward Exchange Policy," Banca Nazionale del Lavoro Quarterly Review, (March, 1958), pp. 56-71.
- Jasay, A. E. "Case for Official Support," The Banker, (April, 1958), pp. 228-29.





- Jasay, A. E. "Making Currency Reserves 'Go Round'," The Journal of Political Economy, Vol. LXVI (August, 1958), pp. 353-56.
- Jasay, A. E. "Forward Exchange: The Case for Intervention," Lloyd's Bank Review, (October, 1958), pp. 35-45.
- Katz, Samuel I. "Yield Differentials in Treasury Bills, 1959-64," Federal Reserve Bulletin, (October, 1964), pp. 1241-52.
- Kindleberger, Charles P. "Speculation and Forward Exchange," The Journal of Political Economy, Vol. XLVII (April, 1939), pp. 163-81.
- Reading, B. "The Forward Pound 1951-59," The Economic Journal, Vol. LXX (June, 1960), pp. 304-19.
- Spraos, J. "The Theory of Forward Exchange and Recent Practice," The Manchester School of Economic and Social Studies, Vol. XXI (May, 1953), pp. 87-117.
- Spraos, J. "Case for an Official Peg," The Banker, (April, 1958), pp. 225-28.
- Spraos, J. "Speculation, Arbitrage and Sterling," The Economic Journal, Vol. LXIX (March, 1959), pp. 1-21.
- Trued, M. N. "Interest Arbitrage, Exchange Rates and Dollar Reserves," The Journal of Political Economy, Vol. LXV (October, 1957), pp. 403-11.
- Tsiang, S. C. "The Theory of Forward Exchange and Effects of Government Intervention on the Forward Exchange Market," International Monetary Fund Staff Papers, Vol. VII (April, 1959), pp. 75-106.

#### Public Documents

- Bank of Canada, Statistical Summary: 1963 Supplement. Ottawa: Bank of Canada, 1963.
- Bank of Canada, Statistical Summary. Ottawa: Bank of Canada, Monthly.
- Department of Finance, Annual Report of the Minister of Finance to Parliament on the Operations of the Exchange Fund Account. Ottawa: Department of Finance, 1964.















**B29834**